OPTOCOUPLER SELECTION GUIDE

FAIRCHILD
SEMICONDUCTOR®

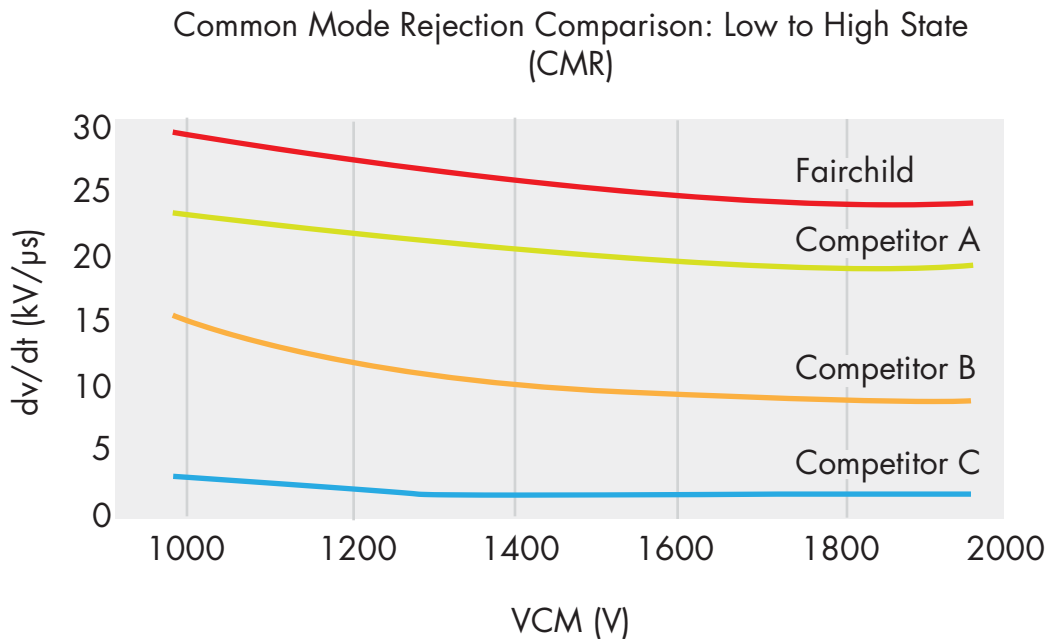Saving our world, 1mW at a time™

INTRODUCTION

Fairchild Semiconductor is a leader in the design and production of optocouplers. We offer a broad range of package platforms and incorporate various combinations of input and output configurations. Our offerings include simple function optocouplers for low bandwidth/general switching applications, high performance optocouplers for high bandwidth/high gain applications, high voltage optocouplers for AC load switching applications and other specific functions that provide unique performance characteristics. The recently introduced 1.0A and 2.5A IGBT/MOSFET gate drive optocouplers complement Fairchild's leading discrete power MOSFET products. Fairchild customers now have a complete offering from the logic control portion of the circuit to the isolated gate driver to the power MOSFET. All of our optocouplers are lead (Pb) free and RoHS compliant. In addition, they are certified by major safety regulatories.

To meet the increasing demands of today's designs, Fairchild offers optocouplers capable of withstanding operating temperatures up to +125°C. Our Microcoupler™ devices are the only plastic package optocouplers capable of meeting this elevated temperature limit to allow for improved Current Transfer Ratio (CTR) stability. Our 4-pin full pitch Mini-Flat package (MFP) and 4-pin DIP package, phototransistor output optocouplers are rated with a maximum operation temperature of +110°C.

Fairchild's new high performance optocouplers have a superior common mode transient immunity advantage, which is 30% better than the competition. This improvement has been achieved through Optoplanar®, Fairchild's coplanar packaging technology, and proprietary shielding of the silicon detector chip. This solution results in a >30% reduction in capacitance vs. the over-under package construction utilized by the competition. CMR is a measure of the device's ability to reject noise.

Common Mode Rejection Comparison: Low to High State (CMR)

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Fairchild's high performance optocouplers have a superior common mode transient immunity advantage (>30% over competition). With their high speed data rates, these optocouplers are ideal to meet the needs of high speed data communications. Portable and compact electronic devices require optocouplers that reduce power consumption and save space. The 3.3V supply voltage specification reduces power consumption by 33%, while the 5-pin MFP and dual channel 8-pin SOP packaging optimize mounting density.
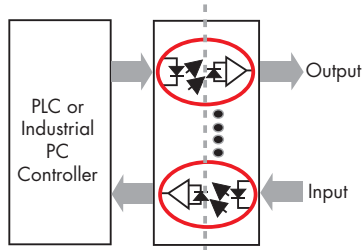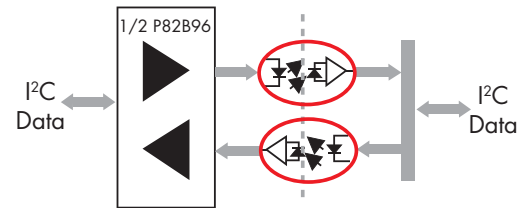

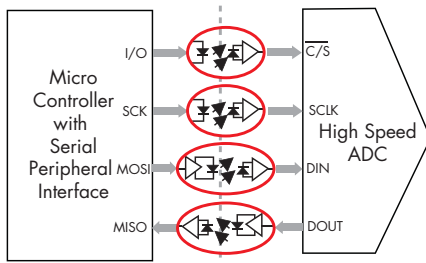*Isolating Digital Input/Output Module*
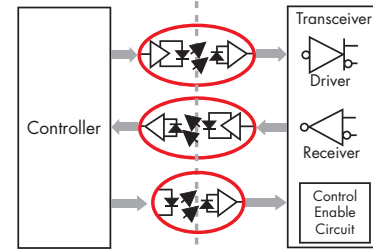
*Isolating FieldBus Interface
(Profibus, DeviceNet, CAN, RS485/RS232)*
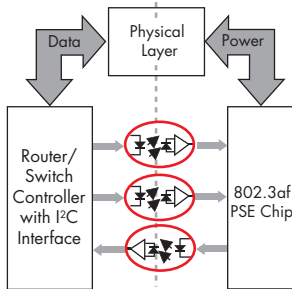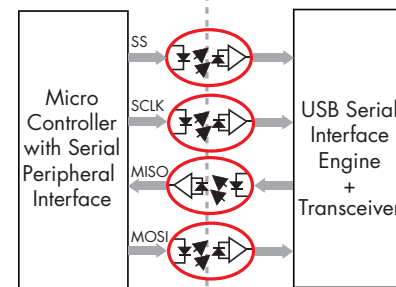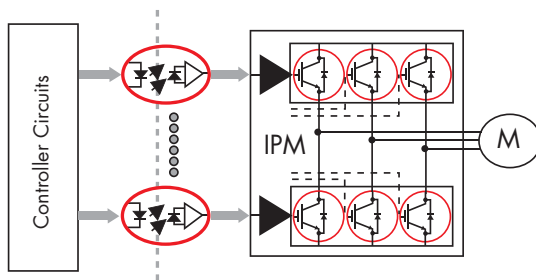

Power Over Ethernet

Isolating Bi-Dir I²C Interface

Isolating Data Acquisition System

Isolating Universal Serial Bus
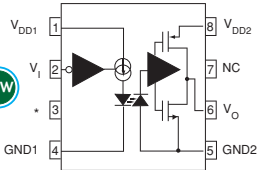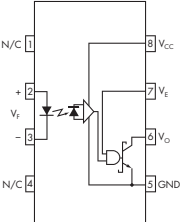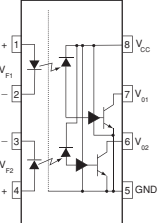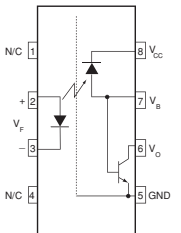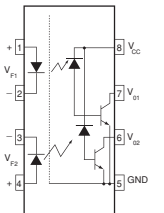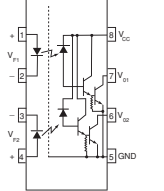
*Motor Drive Control (Optically Isolating
Intelligent Power Module (IPM))*
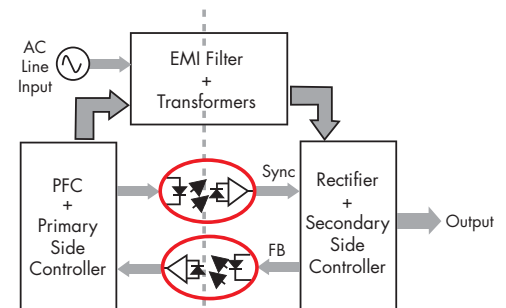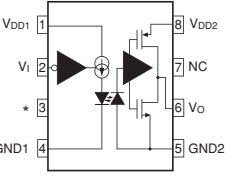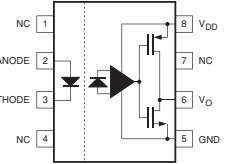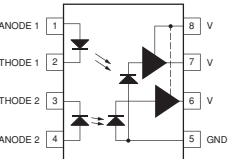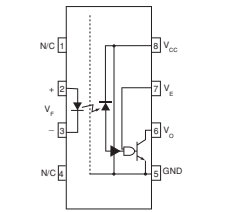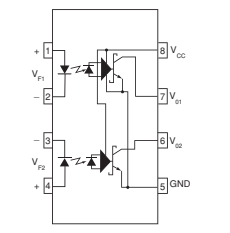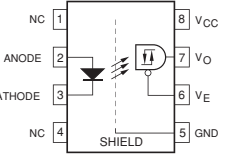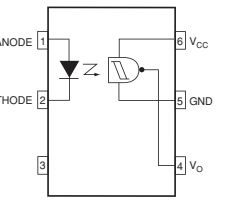
Digital Power Control

Low Voltage (3.3V/5V), High Performance

Product Number	Pin Connections	Package	Data Rate (Mbps)	I_{FT} Max. (mA)	CTR @ I_F=16mA (%) Min.	CTR @ I_F=16mA (%) Max.	V_{OL} Max. (V)	I_{CCL} Max. (mA)	t_{PHL} Max. (ns)	t_{PLH} Max. (ns)	PWD Max. (ns)	CMR Typ. (kV/µs)	V_{ISO} AC_{RMS} (V)	T_{OPR} (°C)
FOD8001		8-Pin SOIC	25	–	–	–	0.1	9	40	40	6	40	3750	-40 to +105
FOD060L		8-Pin SOIC	10	5	–	–	0.6	10	75	90	25	50	3750	-40 to +85
FOD260L		8-Pin DIP	10	5	–	–	0.6	10	75	90	25	50	5000	-40 to +85
HCPL062N		8-Pin SOIC	10	5	–	–	0.6	15	75	90	25	50	2500	-40 to +85
FOD050L		8-Pin SOIC	1	–	15	50	0.3	0.2	1000	1000	–	35	2500	-40 to +85
FOD250L		8-Pin DIP	1	–	15	50	0.3	0.2	1000	1000	–	35	5000	-40 to +85
FOD053L		8-Pin SOIC	1	–	15	50	0.3	0.4	1000	1000	–	35	2500	-40 to +85
FOD073L		8-Pin SOIC	0.1	–	400*	7000	0.3	3	30	90	–	10	2500	-40 to +85

* CTR @ I_F = 1.6mA (%)

High Speed Logic Gate

Product Number	Pin Connections	Package	Data Rate (Mbps)	I_{FT} Max. (mA)	V_{OL} Max. (V)	I_{CCL} Max. (mA)	t_{PHL} Max. (ns)	t_{PLH} Max. (ns)	PWD Max. (ns)	CMR Typ. (kV/µs)	V_{ISO} AC_{RMS} (V)	T_{OPR} (°C)
FOD0721 NEW		8-Pin SOIC	25	–	0.1	9	40	40	6	40	3750	-40 to +100
FOD0720 NEW		8-Pin SOIC	25	–	0.1	9	40	40	8	40	3750	- 40 to +100
FOD0710 NEW		8-Pin SOIC	12.5	–	0.1	9	40	40	8	40	3750	-40 to +100
FOD0708		8-Pin SOIC	15	8.2	0.1	14	60	60	30	50	2500	-40 to +100
FOD0738		8-Pin SOIC	15	8.2	0.1	18	60	60	30	50	2500	-40 to +100
HCPL0600		8-Pin SOIC	10	5	0.6	13	100	100	35	–	3750	-40 to +85
HCPL0601		8-Pin SOIC	10	5	0.6	13	100	100	35	10	3750	-40 to +85
HCPL0611		8-Pin SOIC	10	5	0.6	13	100	100	35	20	3750	-40 to +85
6N137		8-Pin DIP	10	5	0.6	13	100	100	35	10	2500	-40 to +85
HCPL2601		8-Pin DIP	10	5	0.6	13	100	100	35	10	2500	-40 to +85
HCPL2611		8-Pin DIP	10	5	0.6	13	100	100	35	15	2500	-40 to +85
HCPL0637		8-Pin SOIC	10	5	0.6	21	100	100	35	–	3750	-40 to +85
HCPL0638		8-Pin SOIC	10	5	0.6	21	100	100	35	15	3750	-40 to +85
HCPL0639		8-Pin SOIC	10	5	0.6	21	100	100	35	30	3750	-40 to +85
HCPL2630		8-Pin DIP	10	5	0.6	21	100	100	35	10	2500	-40 to +85
HCPL2631		8-Pin DIP	10	5	0.6	21	100	100	35	10	2500	-40 to +85
FOD2200		8-Pin DIP	2.5	1.6	0.5	6	300	300	–	10	5000	-40 to +85
H11N1M		6-Pin DIP	5	3.2	0.5	10	330	330	–	–	4200	-40 to +85
H11N2M		6-Pin DIP	5	5	0.5	10	330	330	–	–	4200	-40 to +85
H11N3M		6-Pin DIP	5	10	0.5	10	330	330	–	–	4200	-40 to +85
H11L1M		6-Pin DIP	1	1.6	0.4	5	4000	4000	–	–	4200	-40 to +85
H11L2M		6-Pin DIP	1	10	0.4	5	4000	4000	–	–	4200	-40 to +85
H11L3M		6-Pin DIP	1	5	0.4	5	4000	4000	–	–	4200	-40 to +85

High Performance Transistors

Product Number	Pin Connections	Package	Data Rate (Mbps)	Current Transfer Ratio Min.	Current Transfer Ratio Max.	V_{OL} Max. (V)	I_{CC} Max. (mA)	t_{PHL} Max. (µs)	t_{PLH} Max. (µs)	CMR Typ. (kV/µs)	V_{ISO} AC_{RMS} (V)	T_{OPR} (°C)
FODM452[2]		5-Pin MFP	1	20	50	0.4	0.2	0.8	0.8	15	3750	-40 to +85
FODM453[1,2]		5-Pin MFP	1	20	50	0.4	0.2	0.8	0.8	40	3750	-40 to +85
HCPL0500		8-Pin SOIC	1	7	50	0.4	0.2	1.5	1.5	10	2500	-40 to +85
HCPL0501		8-Pin SOIC	1	19	50	0.4	0.2	0.8	0.8	10	2500	-40 to +85
HCPL0452[2]		8-Pin SOIC	1	19	50	0.4	0.2	0.8	0.8	10	2500	-40 to +85
HCPL0453[1,2]		8-Pin SOIC	1	19	50	0.4	0.2	0.8	0.8	40	2500	-40 to +85
6N135		8-Pin DIP	1	7	50	0.4	0.2	1.5	1.5	10	2500	-55 to +100
6N136		8-Pin DIP	1	19	50	0.4	0.2	0.8	0.8	10	2500	-55 to +100
HCPL2503		8-Pin DIP	1	12	–	0.4	0.2	0.8	0.8	10	2500	-55 to +100
HCPL4502		8-Pin DIP	1	19	50	0.4	0.2	0.8	0.8	10	2500	-55 to +100
HCPL4503M[1,2]		8-Pin DIP	1	19	50	0.5	0.2	0.8	0.8	30	5000	-40 to +100
HCPL0530		8-Pin SOIC	1	7	50	0.5	0.4	1.5	1.5	10	2500	-40 to +85
HCPL0531		8-Pin SOIC	1	19	50	0.4	0.4	0.8	0.8	10	2500	-40 to +85
HCPL0534[1]		8-Pin SOIC	1	19	50	0.4	0.4	0.8	0.8	40	2500	-40 to +85
HCPL2530		8-Pin DIP	1	7	50	0.5	0.4	1.5	1.5	10	2500	-55 to +100
HCPL2531		8-Pin DIP	1	19	50	0.5	0.4	0.8	0.8	10	2500	-55 to +100
HCPL0700		8-Pin SOIC	0.1	300	2600	0.4	1.5	10	35	10	2500	-40 to +85
HCPL0701		8-Pin SOIC	0.1	500	2600	0.4	1.5	10	35	10	2500	-40 to +85
6N138		8-Pin DIP	0.1	300	–	0.4	1.5	10	35	10	2500	-40 to +85
6N139		8-Pin DIP	0.1	500	–	0.4	1.5	10	35	10	2500	-40 to +85
HCPL0730		8-Pin SOIC	0.1	300	5000	0.4	3	20	35	10	2500	-40 to +85
HCPL0731		8-Pin SOIC	0.1	500	5000	0.4	3	20	35	10	2500	-40 to +85
HCPL2730		8-Pin DIP	0.1	300	–	0.4	3	20	35	10	2500	-40 to +85
HCPL2731		8-Pin DIP	0.1	500	–	0.4	3	20	35	10	2500	-40 to +85

[1] Recommended for IPM Driver
[2] Base not connected

A new addition to Fairchild's broad optocoupler portfolio, these IGBT/MOSFET gate drive optocouplers complement Fairchild's strong well-established offering in the discrete power IGBT/MOSFET line of products. Fairchild now offers customers one-stop shopping from the logic control portion of the circuit to the isolated gate driver to the power IGBT/MOSFET. This combined solution converts the mW to kW providing electrical isolation between the primary and secondary circuits.

Optically Isolating 3-Phase Motor Drive

Isolating IGBT Drive

Isolating Power MOSFET Drive

Isolating Power Transistor Drive
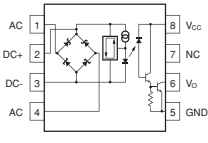
Gate Drivers

Product Number	Pin Connections	I_{OH} Min. (A)	I_{OL} Min. (A)	V_{OH} Min. (V)	V_{OL} Max. (V)	V_{CC} Max. (V)	I_{CC} Max. (mA)	t_{PLH} / t_{PHL} Max. (ns)	PWD Max. (ns)	V_{UVLO+} Max. (V)	V_{UVLO-} Max. (V)	CMR (kV/µs) @ Vcm Min. (V)	V_{ISO} AC_{RMS} (V)	T_{OPR} (°C)
FOD3120		1.0 @ $V_O=V_{CC}$ -3.0V, 2.0 @ $V_O=V_{CC}$ -6V	1.0 @ $V_O=V_{EE}$ +3V, 2.0 @ $V_O=V_{EE}$ +6V	V_{CC} -0.3	V_{EE} +0.3	30	3.8	400	100	11.5 ~13.5	10.0 ~12.0	35 @ 2000	5000	-40 to 100
FOD3150		0.2 @ $V_O=V_{CC}$ -0.75V, 1.0 @ $V_O=V_{CC}$ -4V	0.2 @ $V_O=V_{EE}$ +0.75V, 1.0 @ $V_O=V_{EE}$ +4V	V_{CC} -0.5	V_{EE} +0.5	30	5	500	300	11.0 ~13.5	9.5 ~12.0	20 @ 2000	5000	-40 to 100
FOD3180		0.5 @ $V_O=V_{CC}$ -1V, 2.0 @ $V_O=V_{CC}$ -3V	0.5 @ $V_O=V_{EE}$ +1V, 2.0 @ $V_O=V_{CC}$ +3V	V_{CC} -0.5	V_{EE} +0.5	20	6	200	65	8.3*	7.7*	15 @ 1500	5000	-40 to 100
FOD3181		0.5 @ $V_O=V_{CC}$ -1V	0.5 @ $V_O=V_{EE}$ +1V	V_{CC} -0.5	V_{EE} +0.5	20	6	500	–	–	–	10 @ 1500	5000	-40 to 100

Pin Connections diagram: 8-Pin DIP
NC 1, ANODE 2, CATHODE 3, NC 4, 8 V_{CC}, 7 V_{O2}, 6 V_{O1}, 5 V_{EE}
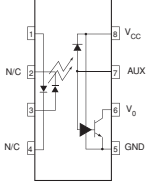
8-Pin DIP

* Typical value

AC-DC to Logic Interface

Product Number	Pin Connections	V_{CC} Max. (V)	I_{CCL} Max. (mA)	VOL Max. (V)	I_{TH+} Max. (mA)	I_{TH}^{-} Max. (mA)	t_{PHL} Typ. (µs)	t_{PLH} Typ. (µs)	V_{ISO} AC$_{RMS}$ (V)	T_{OPR} (°C)
HCPL3700	 8-Pin DIP	18	4	0.4	3.11	1.62	15	40	2500	-40 to +85

AC Line Monitor Logic Output

Product Number	Pin Connections	V_{CC} Max. (V)	I_{CCL} Max. (mA)	VOL Max. (V)	$V_{I(ON)}$ RMS Min. (V)	$V_{I(OFF)}$ RMS Max. (V)	$I_{(ON)}$ RMS Min. (mA)	$I_{(OFF)}$ RMS Max. (mA)	V_{ISO} AC$_{RMS}$ (V)	T_{OPR} (°C)
MID400	 8-Pin DIP	7	3	0.4	90	5.5	4	0.15	2500	-40 to +85

TRIAC DRIVER OPTOCOUPLERS
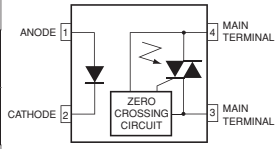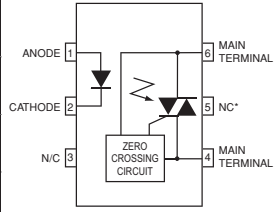
Fairchild Semiconductor is a market leader for optically isolated TRIAC drivers. Our diverse portfolio includes packages ranging from the Mini Flat Package for compact applications to the 6-pin DIP package with wide lead spacing options for applications requiring greater isolation distances. Performance ranges from basic monolithic devices for low cost applications to high performance snubberless devices for applications requiring high dv/dt immunity and low power consumption. Fairchild offers both zero crossing and random phase output switching configurations.
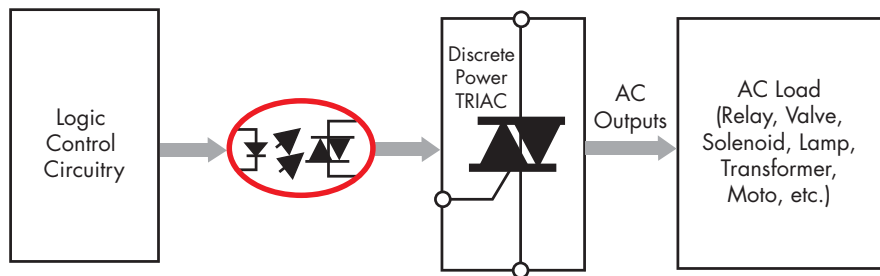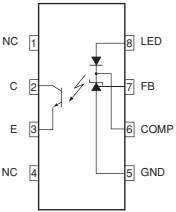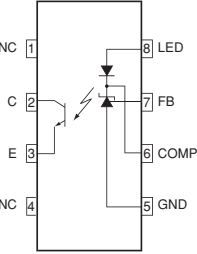
Isolating AC Load Control

Random Phase Triac Driver Optocouplers

Product Number	Pin Connections	V_{DRM} Min. (V)	I_{FT} Max. (mA)	V_{TM} Max. (V)	dv/dt Min. (V/µs)	I_H Typ. (µA)	I_{DRM} Max. (nA)	V_{ISO} AC_{RMS} (V)	T_{OPR} (°C)
FODM3011		250	10	3	–	300	100	3750	-40 to +110
FODM3012		250	5	3	–	300	100	3750	-40 to +110
FODM3022		400	10	3	–	300	100	3750	-40 to +110
FODM3023		400	5	3	–	300	100	3750	-40 to +110
FODM3052		600	10	3	1000	300	100	3750	-40 to +110
FODM3053	*4-Pin, Full Pitch MFP*	600	5	3	1000	300	100	3750	-40 to +110
MOC3010M		250	15	3	–	100	100	4200	-40 to +85
MOC3011M		250	10	3	–	100	100	4200	-40 to +85
MOC3012M		250	5	3	–	100	100	4200	-40 to +85
MOC3020M		400	30	3	–	100	100	4200	-40 to +85
MOC3021M		400	15	3	–	100	100	4200	-40 to +85
MOC3022M		400	10	3	–	100	100	4200	-40 to +85
MOC3023M		400	5	3	–	100	100	4200	-40 to +85
MOC3051M		600	15	2.5	1000	280	100	4200	-40 to +85
MOC3052M	*6-Pin DIP*	600	10	2.5	1000	280	100	4200	-40 to +85
FOD420 NEW		600	2	3	10000	200	100	5000	-55 to +100
FOD4216 NEW		600	1.3	3	10000	200	100	5000	-55 to +100
FOD4208 NEW		800	2	3	10000	200	100	5000	-55 to +100
FOD4218 NEW		800	1.3	3	10000	200	100	5000	-55 to +100

Zero Crossing Triac Driver Optocouplers

Product Number	Pin Connections	V^{DRM} Min. (V)	I_{FT} Max. (mA)	V_{TM} Max. (V)	dv/dt Min. (V/µs)	I_H Typ. (µA)	V_{INH} Max. (V)	I_{DRM} Max. (nA)	V_{ISO} AC$_{RMS}$ (V)	T_{OPR} (°C)
FODM3062		600	10	3	600	300	20	500	3750	-40 to +110
FODM3063		600	5	3	600	300	20	500	3750	-40 to +110
FODM3082		800	10	3	600	300	20	500	3750	-40 to +110
FODM3083	4-Pin, Full Pitch MFP	800	5	3	600	300	20	500	3750	-40 to +110
MOC3031M		250	15	3	1000	400	20	100	4200	-40 to +85
MOC3032M		250	10	3	1000	400	20	100	4200	-40 to +85
MOC3033M		250	5	3	1000	400	20	100	4200	-40 to +85
MOC3041M		400	15	3	1000	400	20	100	4200	-40 to +85
MOC3042M		400	10	3	1000	400	20	100	4200	-40 to +85
MOC3043M		400	5	3	1000	400	20	100	4200	-40 to +85
MOC3061M		600	15	3	600	500	20	500	4200	-40 to +85
MOC3062M		600	10	3	600	500	20	500	4200	-40 to +85
MOC3063M		600	5	3	600	500	20	500	4200	-40 to +85
MOC3162M		600	10	3	1000	500	15	100	4200	-40 to +85
MOC3163M	6-Pin DIP	600	5	3	1000	500	15	100	4200	-40 to +85
FOD410 NEW		600	2	3	10000	200	25	100	5000	-55 to +100
FOD4116 NEW		600	1.3	3	10000	200	25	100	5000	-55 to +100
MOC3081M		800	15	3	600	500	20	500	4200	-40 to +85
MOC3082M		800	10	3	600	500	20	500	4200	-40 to +85
MOC3083M		800	5	3	600	500	20	500	4200	-40 to +85
FOD4108 NEW		800	2	3	10000	200	25	100	5000	-55 to +100
FOD4118 NEW		800	1.3	3	10000	200	25	100	5000	-55 to +100

Isolated Error Amplifiers, DC Sensing Input with Voltage Reference

Product Number	Pin Connections	V_{REF} Tolerance (%)	V_{REF} (V)			CTR @ I_F = 10mA (%)		BV_{CEO} (V)	V_{ISO} AC_{RMS} (V)	T_{OPR} (°C)
			Typ.	Min.	Max.	Min.	Max.	Min.		
FOD2712	8-Pin SOIC	1.0	1.240	1.221	1.259	100	200	70	2500	-40 to +85
FOD2742A		0.5	2.495	2.482	2.508	100	200	70	2500	-25 to +85
FOD2742B		1.0	2.495	2.470	2.520	100	200	70	2500	-25 to +85
FOD2742C		2.0	2.495	2.450	2.550	100	200	70	2500	-25 to +85
FOD2711	8-Pin DIP	1.0	1.240	1.221	1.259	100	200	70	5000	-40 to +85
FOD2741A		0.5	2.495	2.482	2.508	100	200	70	5000	-25 to +85
FOD2741B		1.0	2.495	2.470	2.520	100	200	70	5000	-25 to +85
FOD2741C		2.0	2.495	2.450	2.550	100	200	70	5000	-25 to +85
FOD2743A		0.5	2.495	2.482	2.508	50	100	70	5000	-25 to +85
FOD2743B		1.0	2.495	2.470	2.520	50	100	70	5000	-25 to +85
FOD2743C		2.0	2.495	2.450	2.550	50	100	70	5000	-25 to +85

Pin Connections (8-Pin SOIC):
NC 1, C 2, E 3, NC 4, GND 5, COMP 6, FB 7, LED 8

Pin Connections (8-Pin DIP):
NC 1, C 2, E 3, NC 4, GND 5, COMP 6, FB 7, LED 8

Phototransistor Output-DC Sensing Input

Product Number	Pin Connections	Package	CTR (%)		BV_{CEO} Min. (V)	BV_{CBO} Min. (V)	BV_{ECO} Min. (V)	t_{ON} Typ. (µs)	t_{OFF} Typ. (µs)	V_{ISO} AC_{RMS} (V)	T_{OPR} (°C)
			Min.	Max.							
FOD817*		4-Pin DIP	50	600	70	–	6	–	–	5000	-55 to +110
FODB100		4-Pin BGA	100	–	75	–	7	3	5	2500	-40 to +125
FODB101		4-Pin BGA	100	200	75	–	7	3	5	2500	-40 to +125
FODB102		4-Pin BGA	150	300	75	–	7	3	5	2500	-40 to +125
HMHA2801*		4-Pin Half-Pitch MFP	80	600	80	–	7	–	–	2500	-55 to +100
HMHA281		4-Pin Half-Pitch MFP	50	600	80	–	7	–	–	2500	-55 to +100
FODM121*		4-Pin Full-Pitch MFP	50	600	80	–	7	–	–	3750	-40 to +110
FODM124		4-Pin Full-Pitch MFP	100	1200	80	–	7	–	–	3750	-40 to +110
FODM2701*		4-Pin Full-Pitch MFP	50	300	40	–	7	–	–	3750	-40 to +110
MCT4		4-Pin TO-18	15	–	30	–	7	–	–	1000	-55 to +125
MCT4R		4-Pin TO-18	15	–	30	–	7	–	–	1000	–55 to +125

Pin Connections: ANODE 1, CATHODE 2, COLLECTOR 4, EMITTER 3
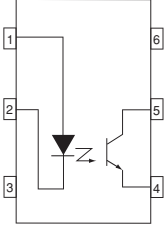
CTR option available

Phototransistor Output-DC Sensing Input

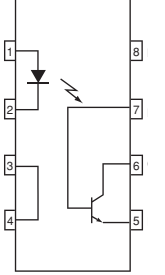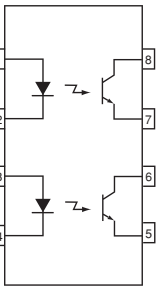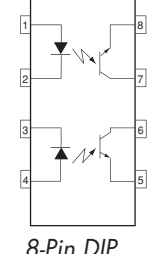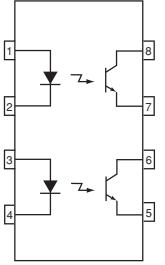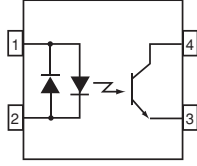| Product Number	Pin Connections	CTR (%) Min.	CTR (%) Max.	BV$_{CEO}$ Min. (V)	BV$_{CBO}$ Min. (V)	BV$_{ECO}$ Min. (V)	t$_{ON}$ Typ. (µs)	t$_{OFF}$ Typ. (µs)	V$_{ISO}$ AC$_{RMS}$ (V)	T$_{OPR}$ (°C)
4N25M		20	–	30	70	7	2	2	4200	-55 to +100
4N26M		20	–	30	70	7	2	2	4200	-55 to +100
4N27M		10	–	30	70	7	2	2	4200	-55 to +100
4N28M		10	–	30	70	7	2	2	4200	-55 to +100
4N35M		100	–	30	70	7	2	2	4200	-55 to +100
4N36M		100	–	30	70	7	2	2	4200	-55 to +100
4N37M		100	–	30	70	7	2	2	4200	-55 to +100
H11A1M		50	–	30	70	7	2	2	4200	-55 to +100
H11A2M		20	–	30	70	7	2	2	4200	-55 to +100
H11A3M		20	–	30	70	7	2	2	4200	-55 to +100
H11A4M		10	–	30	70	7	2	2	4200	-55 to +100
H11A5M		30	–	30	70	7	2	2	4200	-55 to +100
H11AV1M		100	300	70	70	7	15*	15*	4200	-40 to +100
H11AV2M		50	–	70	70	7	15*	15*	4200	-40 to +100
MCT2M		20	–	30	70	7	2	2	4200	-40 to +100
MCT2EM		20	–	30	70	7	2	2	4200	-40 to +100
MCT271M		45	90	30	70	7	2	2	4200	-40 to +100
MCT210M		150	–	30	70	7	1	50	4200	-40 to +100
MOC8100M		50	–	30	70	7	20*	20*	4200	-55 to +100
TIL111M		–	–	30	70	7	–	–	4200	-55 to +100
TIL117M		50	–	30	70	7	10*	10*	4200	-55 to +100
CNY171M		40	80	70	70	7	2	3	4200	-40 to +100
CNY172M		63	125	70	70	7	2	3	4200	-40 to +100
CNY173M		100	200	70	70	7	2	3	4200	-40 to +100
CNY174M		160	320	70	70	7	2	3	4200	-40 to +100
H11AG1M		300	–	30	70	7	5	5	4200	-40 to +100
MCT5201M		120	–	30	30	5	3	12	4200	-40 to +100
MCT5210M		70	–	30	30	5	7	8	4200	-40 to +100
MCT5211M		150	–	30	30	5	15	11	4200	-40 to +100
4N38M		20	–	80	80	7	5	5	4200	-40 to +100
H11D1M		20	–	300	300	7	5	5	4200	-40 to +100
H11D2M		20	–	300	300	7	5	5	4200	-40 to +100
H11D3M		20	–	200	200	7	5	5	4200	-40 to +100
MOC8204M		20	–	400	400	7	5	5	4200	-40 to +100

Pin Connections diagram:

1 — (△)   6
2 —   5
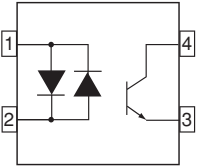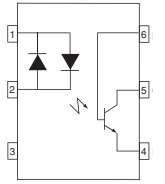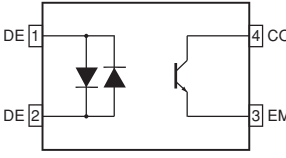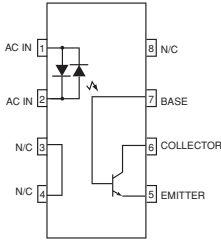3 — NC   4
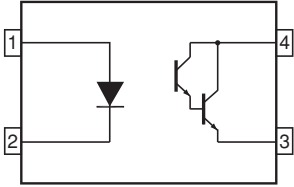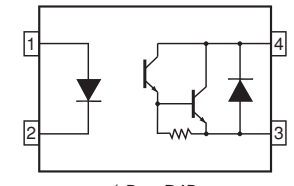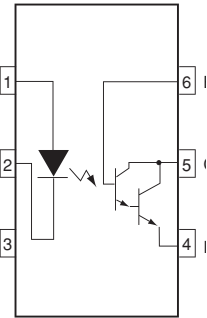
6-Pin DIP
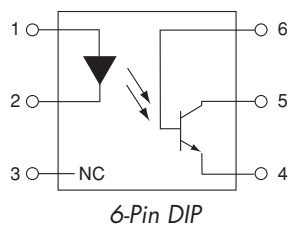
* Maximum value

Phototransistor Output-DC Sensing Input

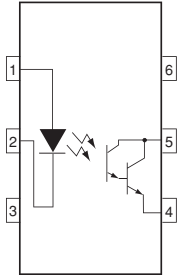| Product Number	Pin Connections	CTR (%)		BV_{CEO} Min. (V)	BV_{CBO} Min. (V)	BV_{ECO} Min. (V)	t_{ON} Typ. (µs)	t_{OFF} Typ. (µs)	V_{ISO} AC_{RMS} (V)	T_{OPR} (°C)
		Min.	Max.							
CNY17F1M		40	80	70	–	7	2	3	4200	-40 to +100
CNY17F2M		63	125	70	–	7	2	3	4200	-40 to +100
CNY17F3M		100	200	70	–	7	2	3	4200	-40 to +100
CNY17F4M	6-Pin DIP	160	320	70	–	7	2	3	4200	-40 to +100
MOC8106M		50	150	70	–	7	2	3	4200	-40 to +100
MOC8111M		20	–	70	–	7	6	5.5	4200	-40 to +100
MOC8112M		50	–	70	–	7	6	5.5	4200	-40 to +100
MOC8113M		100	–	70	–	7	6	5.5	4200	-40 to +100
MOC205M		40	80	70	70	7	7.5	5.7	2500	-40 to +100
MOC206M		63	125	70	70	7	7.5	5.7	2500	-40 to +100
MOC207M		100	200	70	70	7	7.5	5.7	2500	-40 to +100
MOC208M		40	125	70	70	7	7.5	5.7	2500	-40 to +100
MOC211M		20	–	30	70	7	7.5	5.7	2500	-40 to +100
MOC212M		50	–	30	70	7	7.5	5.7	2500	-40 to +100
MOC213M		100	–	30	70	7	7.5	5.7	2500	-40 to +100
MOC215M		20	–	30	70	7	4	4	2500	-40 to +100
MOC216M		50	–	30	70	7	4	4	2500	-40 to +100
MOC217M	8-Pin SOIC	100	–	30	70	7	4	4	2500	-40 to +100
MOCD207M		100	200	70	70	7	3	2.8	2500	-40 to +100
MOCD208M		40	125	70	70	7	3	2.8	2500	-40 to +100
MOCD211M		20	–	30	–	7	7.5	5.7	2500	-40 to +100
MOCD213M		100	–	70	–	7	3	2.8	2500	-40 to +100
MOCD217M	8-Pin SOIC	100	–	30	–	7	7.5	5.7	2500	-40 to +100
MCT6		20	–	30	–	6	2.4	2.4	5300	-55 to +100
MCT61		50	–	30	–	6	2.4	2.4	5300	-55 to +100
MCT62	8-Pin DIP	100	–	30	–	6	2.4	2.4	5300	-55 to +100
MCT9001	8-Pin DIP	50	600	55	–	7	3	3	5300	-55 to +100
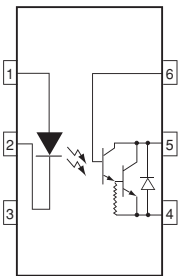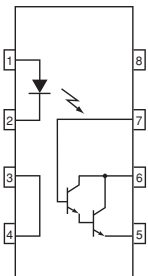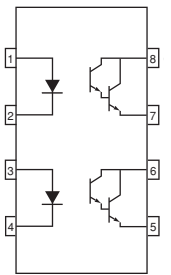
Phototransistor Output-AC Sensing Input

Product Number	Pin Connections	CTR (%)		BV$_{CEO}$ Min. (V)	BV$_{CBO}$ Min. (V)	BV$_{ECO}$ Min. (V)	t$_R$ Typ. (µs)	t$_F$ Typ. (µs)	V$_{ISO}$ AC$_{RMS}$ (V)	T$_{OPR}$ (°C)
		Min.	Max.							
HMHAA280	4-Pin Half-Pitch MFP	50	600	80	–	7	3	3	2500	-55 to +100
FODM2705	4-Pin Half-Pitch MFP	50	300	40	–	7	3	3	3750	-40 to +110
FOD814	4-Pin DIP	20*	300	70	–	6	4	3	5000	-55 to +105
H11AA1M, H11AA2M, H11AA3M, H11AA4M	6-Pin DIP	20, 10, 50, 100	–	30	70	7	–	–	4200	-40 to +100
MOC256M	8-Pin SOIC	20	–	30	70	5	–	–	2500	-40 to +100

Max. value

Photodarlington Output

Product Number	Pin Connections	CTR (%)		BV_{CEO} Min. (V)	BV_{CBO} Min. (V)	BV_{ECO} Min. (V)	t_{ON} Typ. (µs)	t_{OFF} Typ. (µs)	V_{ISO} A_{CRMS} (V)	T_{OPR} (°C)
		Min.	Max.							
FOD815	4-Pin DIP	600	7500	35	–	6	–	–	5000	-30 to +105
FOD852	4-Pin DIP	1000	15000	300	–	0.1	–	–	5000	-30 to +100
4N29M		100	–	30	30	5	5*	40*	5300	-40 to +100
4N30M		100	–	30	30	5	5*	40*	5300	-40 to +100
4N32M		500	–	30	30	5	5*	100*	5300	-40 to +100
4N33M		500	–	30	30	5	5*	100*	5300	-40 to +100
H11B1M		500	–	25	30	7	25	18	5300	-40 to +100
TIL113M	6-Pin DIP	300	–	30	30	7	5*	100*	5300	-40 to +100

*Max. value

Photodarlington Output

Product Number	Pin Connections	CTR (%)		BV_{CEO} Min. (V)	BV_{CBO} Min. (V)	BV_{ECO} Min. (V)	t_{ON} Typ. (µs)	t_{OFF} Typ. (µs)	$V_{ISO} A_{CRMS}$ (V)	T_{OPR} (°C)
		Min.	Max.							
MOC119M		300	–	30	–	7	3.5	95	5300	-40 to +100
MOC8050M	6-Pin DIP	500	–	80	–	5	8.5	95	5300	-40 to +110
MOC8021M		1000	–	50	–	5	8.5	95	5300	-40 to +110
H11G1M		500	–	100	100	7	5	100	5300	-40 to +100
H11G2M	6-Pin DIP	500	–	80	80	7	5	100	5300	-40 to +100
H11G3M		200	–	55	55	7	5	100	5300	-40 to +100
MOC223M	8-Pin SOIC	500	–	30	–	7	10	0.125	2500	-40 to +100
MOCD223M	8-Pin SOIC	500	–	30	–	7	8	55	2500	-40 to +100

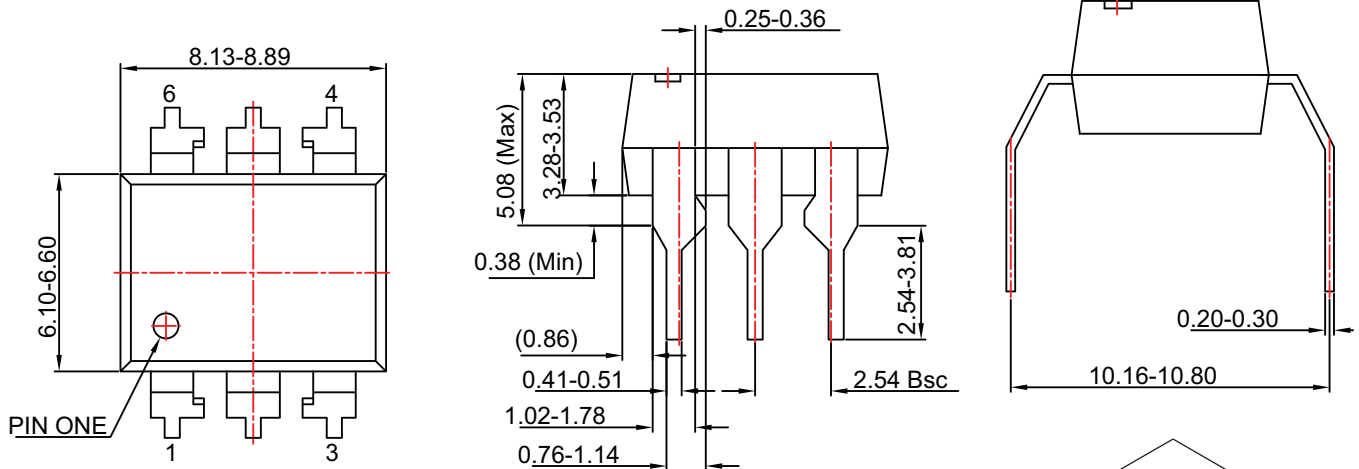## Optically Coupled Solid State Relays, DC Threshold Sensing Input

Product Number	Pin Connections	Connection	$I_{F(ON)}$ Max. (mA)	V_{OPR} Max. (VDC)	I_L Max. (mA)	$R_{(ON)}$ Max. (Ω)	I_{LMT} (mA) Max.	V_{ISO} AC$_{RMS}$ (V)	T_{OPR} (°C)
HSR312		Series	2	250	190	10	–	4000	-40 to +85
		Parallel			320	3			
HSR312L		Series	2	250	170	15	300	4000	-40 to +85
		Parallel			300	4.25	560		
HSR412		Series	3	400	140	27	–	4000	-40 to +85
		Parallel			210	7			
HSR412L		Series	3	400	120	35	220	4000	-40 to +85
		Parallel			200	9	440		
H11F1M		–	–	30	–	200	–	5300	-55 to +100
H11F2M		–	–	30	–	330	–	5300	-55 to +100
H11F3M		–	–	15	–	470	–	5300	-55 to +100

Pin Connections (HSR series): ANODE 1, CATHODE 2, N/C 3, DRAIN 4, DRAIN 6 — *6-Pin DIP*

Pin Connections (H11F series): ANODE 1, CATHODE 2, OUTPUT TERMINAL 6, OUTPUT TERMINAL 4 — *6-Pin DIP*

6 Lead, MDIP, White 0.4" Lead Spacing

8.13-8.89

6

4

6.10-6.60

PIN ONE

1   3

0.25-0.36

5.08 (Max)

3.28-3.53

0.38 (Min)

(0.86)

0.41-0.51

1.02-1.78

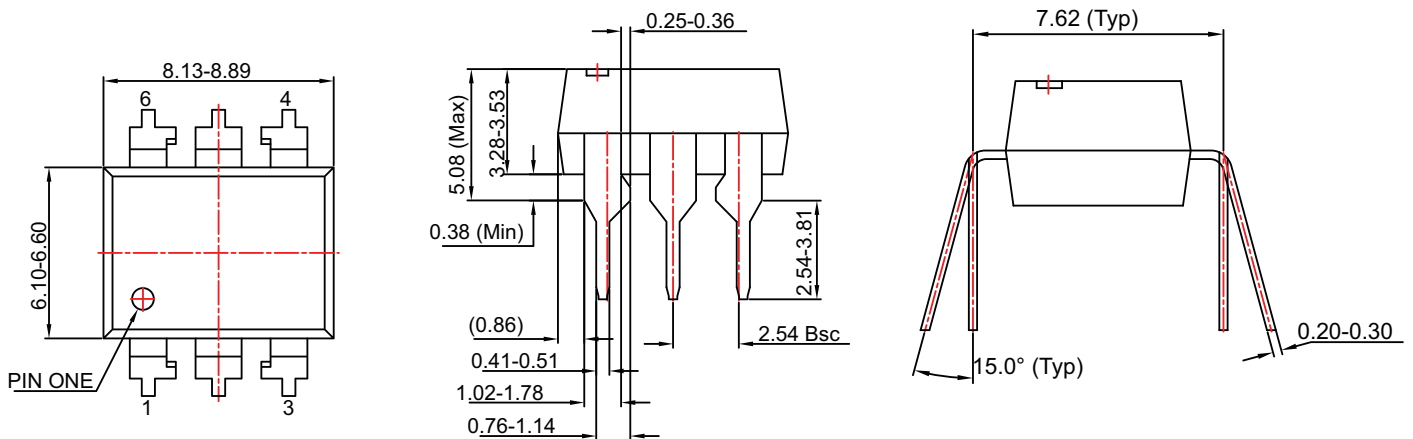0.76-1.14

2.54-3.81

2.54 Bsc

0.20-0.30

10.16-10.80

6

1

NOTES:

A) NO STANDARD APPLIES TO THIS PACKAGE.

B) ALL DIMENSIONS ARE IN MILLIMETERS.

C) DIMENSIONS ARE EXCLUSIVE OF BURRS,
   MOLD FLASH, AND TIE BAR EXTRUSION.

D) DRAWING FILENAME AND REVISION: MKT-N06DREV3.
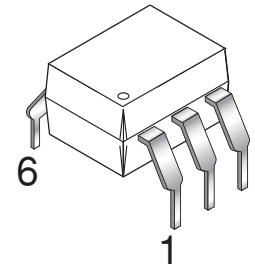
6 Lead, MDIP, White, .300" Wide

8.13-8.89

6

4

6.10-6.60

PIN ONE

1   3

0.25-0.36

5.08 (Max)

3.28-3.53

0.38 (Min)

(0.86)

0.41-0.51

1.02-1.78

0.76-1.14

2.54-3.81

2.54 Bsc

7.62 (Typ)

15.0° (Typ)

0.20-0.30

6

1

NOTES:

A) NO STANDARD APPLIES TO THIS PACKAGE.

B) ALL DIMENSIONS ARE IN MILLIMETERS.

C) DIMENSIONS ARE EXCLUSIVE OF BURRS,
   MOLD FLASH, AND TIE BAR EXTRUSION.
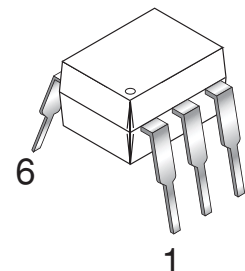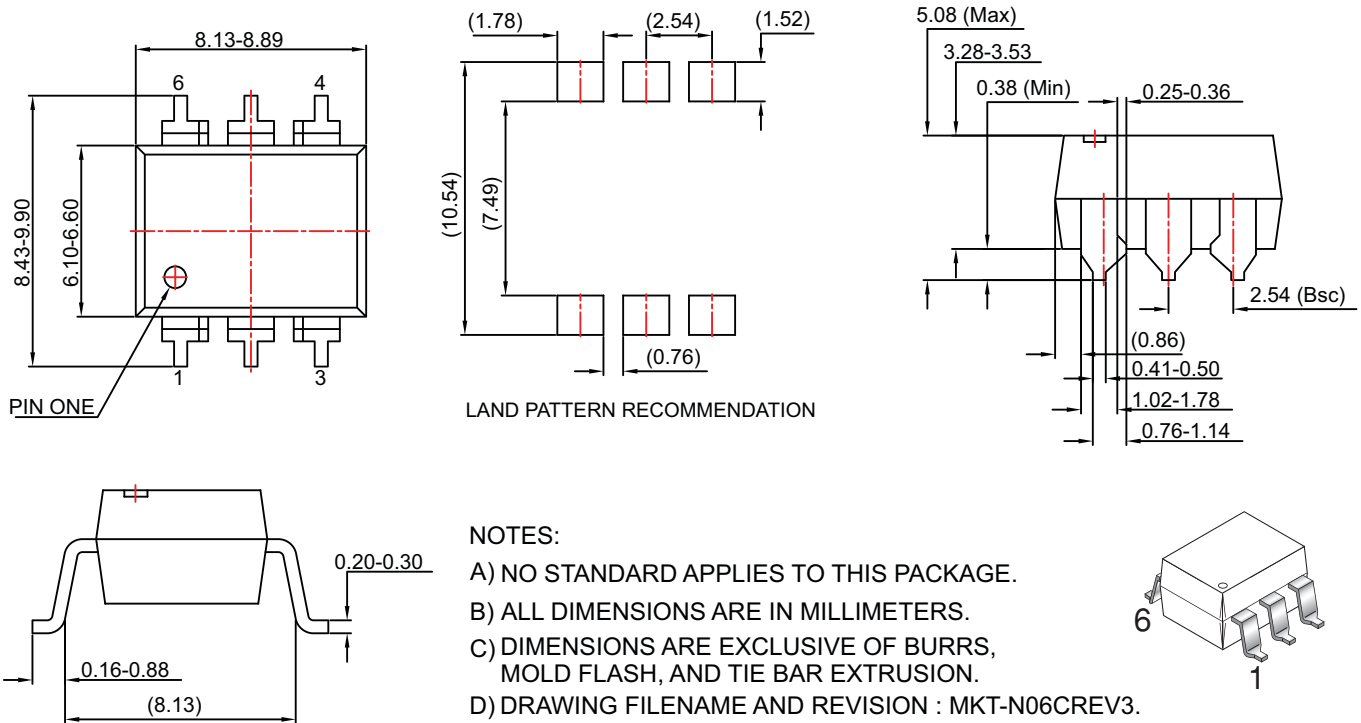
D) DRAWING FILENAME AND REVISION: MKT-NA06BREV3.

Refer to datasheet for package dimensions for a specific product.

6 Lead, MDIP, Surface Mount Lead Form

8.13-8.89

6

4

8.43-9.90

6.10-6.60

1

3

PIN ONE

(1.78)   (2.54)   (1.52)

(10.54)

(7.49)

(0.76)

LAND PATTERN RECOMMENDATION

5.08 (Max)

3.28-3.53

0.38 (Min)   0.25-0.36

2.54 (Bsc)

(0.86)

0.41-0.50

1.02-1.78

0.76-1.14

0.20-0.30

0.16-0.88

(8.13)

NOTES:

A) NO STANDARD APPLIES TO THIS PACKAGE.

B) ALL DIMENSIONS ARE IN MILLIMETERS.

C) DIMENSIONS ARE EXCLUSIVE OF BURRS,
   MOLD FLASH, AND TIE BAR EXTRUSION.
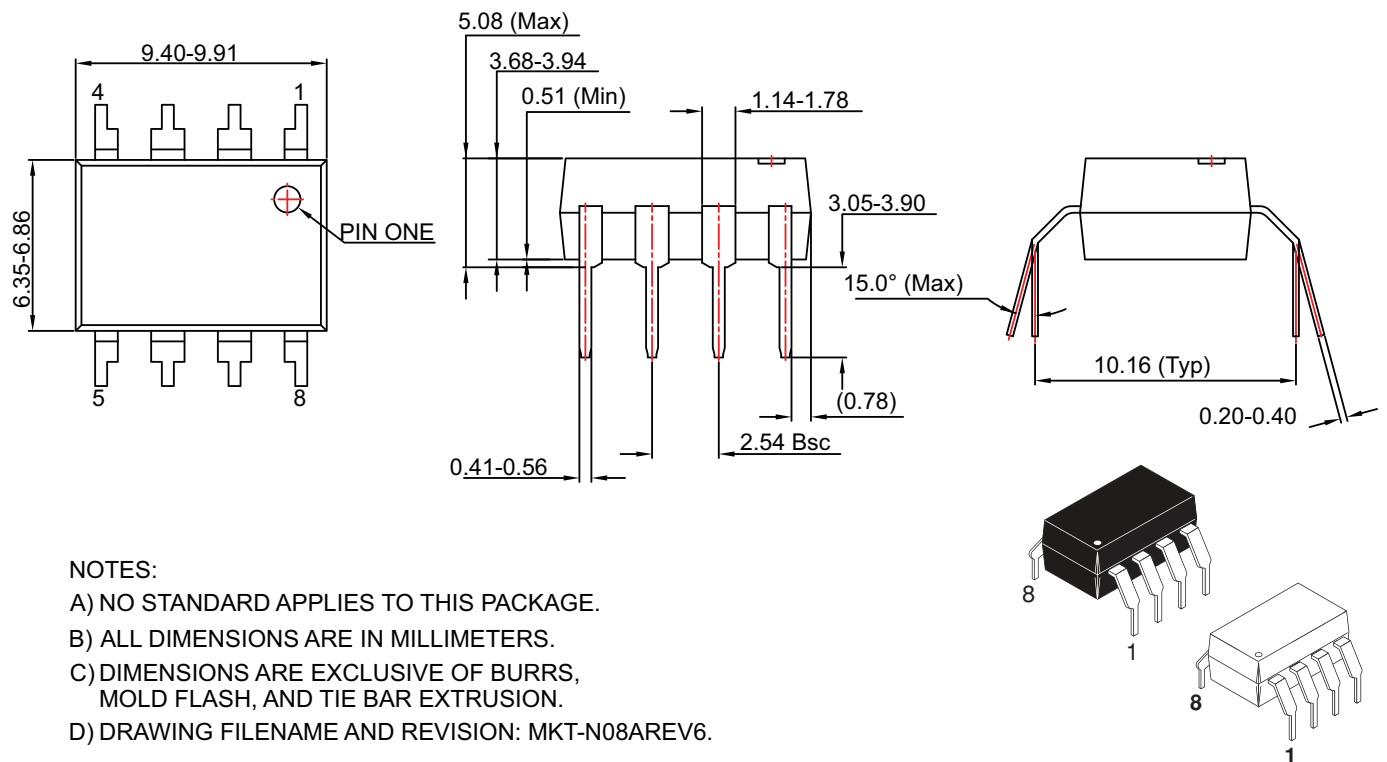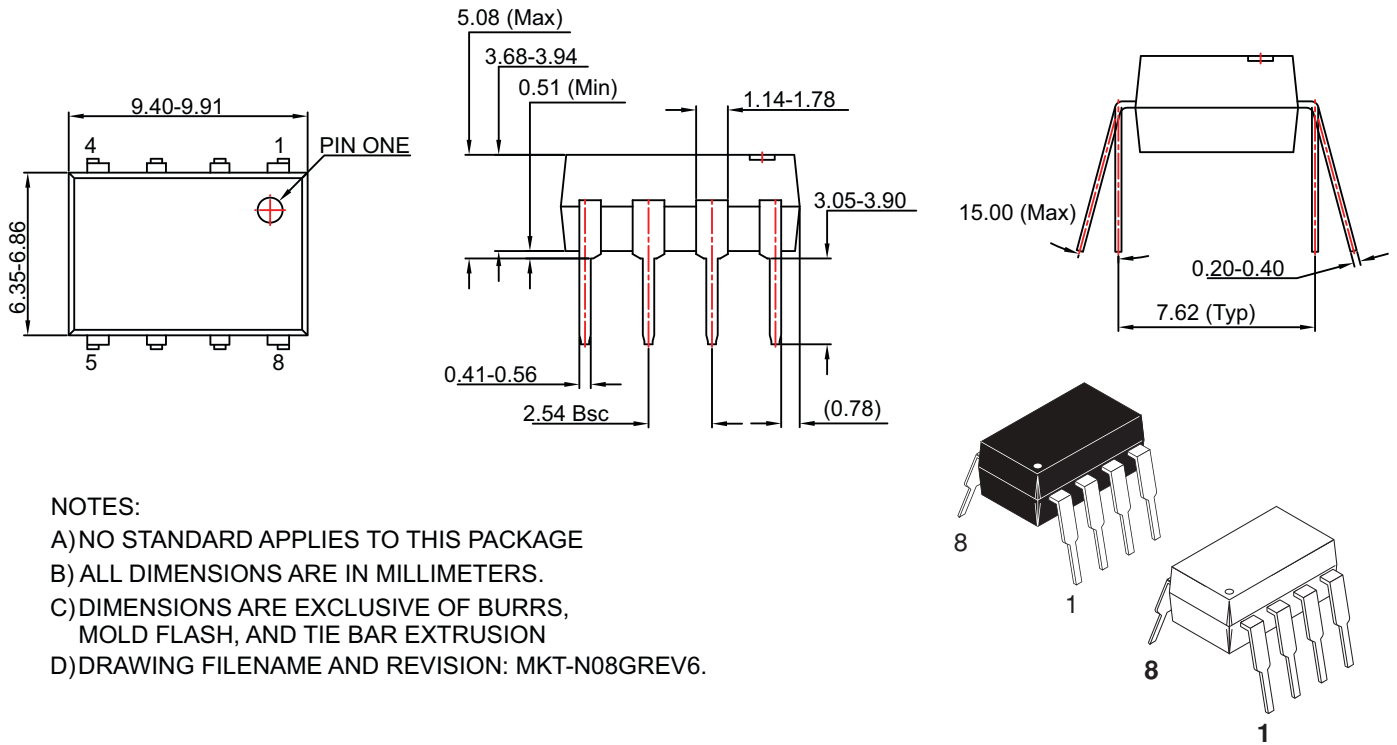
D) DRAWING FILENAME AND REVISION : MKT-N06CREV3.

6

1

8 Lead, MDIP, .4" Lead Spacing, Black and White

9.40-9.91

4

1

6.35-6.86

5

8

PIN ONE

5.08 (Max)

3.68-3.94

0.51 (Min)   1.14-1.78

3.05-3.90

15.0° (Max)

(0.78)

2.54 Bsc

0.41-0.56

10.16 (Typ)

0.20-0.40

NOTES:

A) NO STANDARD APPLIES TO THIS PACKAGE.

B) ALL DIMENSIONS ARE IN MILLIMETERS.

C) DIMENSIONS ARE EXCLUSIVE OF BURRS,
   MOLD FLASH, AND TIE BAR EXTRUSION.

D) DRAWING FILENAME AND REVISION: MKT-N08AREV6.

8

1

8

1

Refer to datasheet for package dimensions for a specific product.

8 Lead, MDIP, .300" Wide, Black and White

9.40-9.91

4　　　　　1　PIN ONE

6.35-6.86

5　　　　　8

5.08 (Max)
3.68-3.94
0.51 (Min)
1.14-1.78
3.05-3.90
0.41-0.56
2.54 Bsc
(0.78)

15.00 (Max)
0.20-0.40
7.62 (Typ)

8

1

8

1

NOTES:
A) NO STANDARD APPLIES TO THIS PACKAGE
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE EXCLUSIVE OF BURRS,
   MOLD FLASH, AND TIE BAR EXTRUSION
D) DRAWING FILENAME AND REVISION: MKT-N08GREV6.

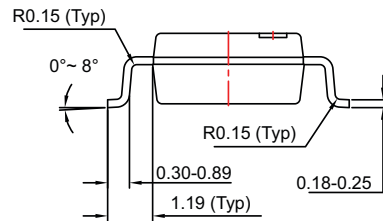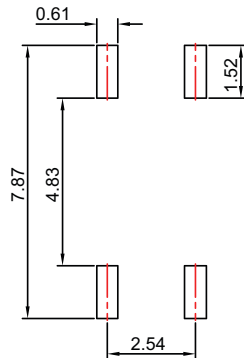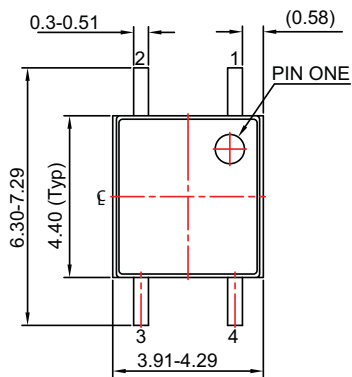## 8 Lead, MDIP, Black and White, Surface Mount Lead Form
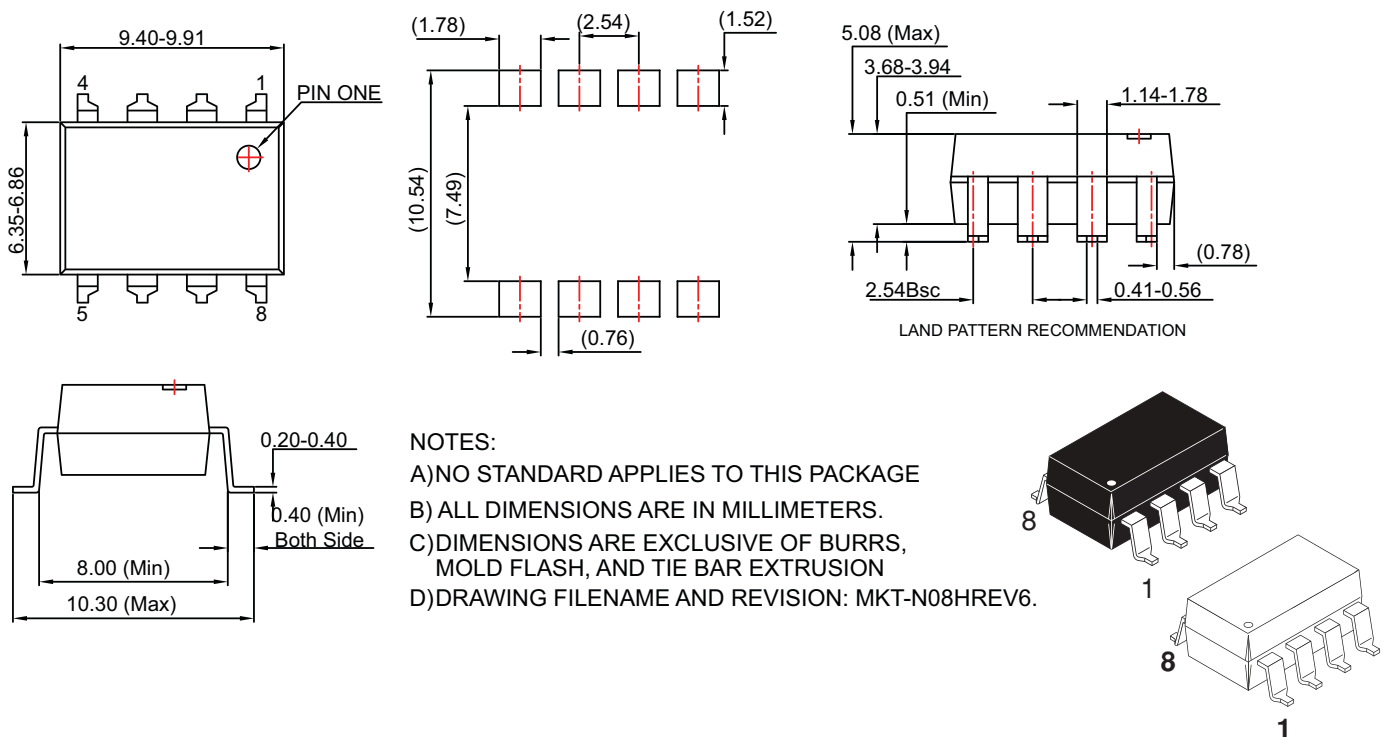
9.40-9.91

4　　　　　1　PIN ONE

6.35-6.86

5　　　　　8

(1.78)　(2.54)　(1.52)
(10.54)
(7.49)
(0.76)

5.08 (Max)
3.68-3.94
0.51 (Min)
1.14-1.78
2.54Bsc
0.41-0.56
(0.78)

LAND PATTERN RECOMMENDATION

0.20-0.40
0.40 (Min)
Both Side
8.00 (Min)
10.30 (Max)

NOTES:
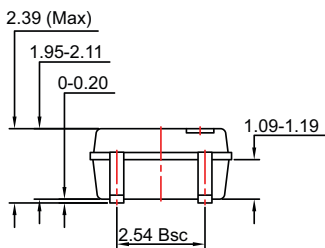A) NO STANDARD APPLIES TO THIS PACKAGE
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE EXCLUSIVE OF BURRS,
   MOLD FLASH, AND TIE BAR EXTRUSION
D) DRAWING FILENAME AND REVISION: MKT-N08HREV6.

8

1

8

1

Refer to datasheet for package dimensions for a specific product.
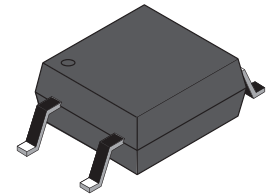
4 Lead, MFP (Mini Flat Package), Full-Pitch

0.3-0.51 (0.58)

2 1 PIN ONE

6.30-7.29

4.40 (Typ)

3 4
3.91-4.29

0.61

7.87

4.83

1.52

2.54

R0.15 (Typ)

0°~ 8°

R0.15 (Typ)

0.30-0.89
1.19 (Typ)

0.18-0.25

LAND PATTERN RECOMMENDATION

2.39 (Max)

1.95-2.11

0-0.20

1.09-1.19

2.54 Bsc
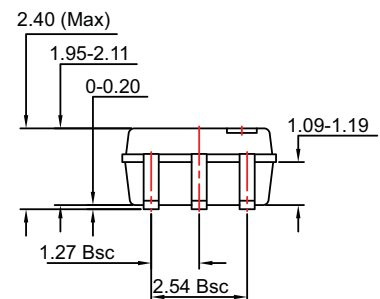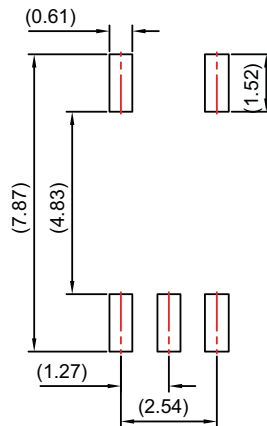
NOTES:

A) NO STANDARD APPLIES TO THIS PACKAGE
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE EXCLUSIVE OF BURRS,
   MOLD FLASH, AND TIE BAR EXTRUSION
D) DRAWING FILENAME AND REVSION : MKT-MFP04BREV2.

5 Lead, MFP (Mini-Flat Package), Full-Pitch, White

0.3-0.5 (0.58)

3 1 PIN ONE

6.30-7.30

4.20-4.60

4 5 6
3.90-4.30

(0.61)

(7.87)

(4.83)

(1.52)

(1.27)

(2.54)

2.40 (Max)

1.95-2.11

0-0.20

1.09-1.19

1.27 Bsc

2.54 Bsc

LAND PATTERN RECOMMENDATION

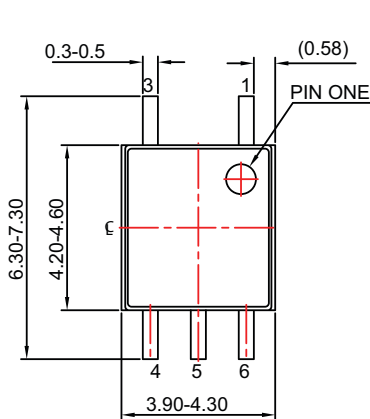R0.15 (Typ)
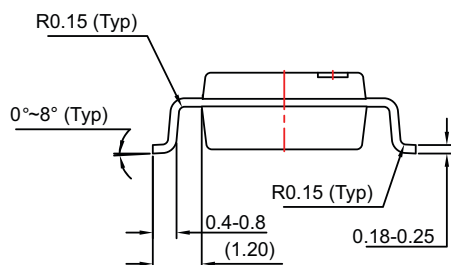
0°~8° (Typ)

R0.15 (Typ)

0.4-0.8
(1.20)

0.18-0.25

NOTES:

A) NO STANDARD APPLIES TO THIS PACKAGE
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE EXCLUSIVE OF BURRS,
   MOLD FLASH, AND TIE BAR EXTRUSION
D) DRAWING FILENAME AND REVISION : MKT-MFP05AREV2.
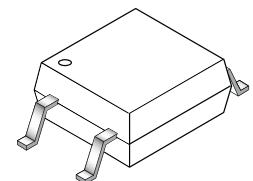
Refer to datasheet for package dimensions for a specific product.

4 Lead, MFP (Mini Flat Package), Half-Pitch, White

0.3-0.51 (0.41)

PIN ONE

6.30-7.29
4.40 (Typ)

2.31-2.69

0.61
1.52
7.87
4.83
1.27

LAND PATTERN RECOMMENDATION

R0.15 (Typ)
0°~8°
R0.15 (Typ)
0.30-0.89   0.18-0.25
1.19 (Typ)

2.39 (Max)
1.95-2.11
0-0.20
1.27 Bsc

NOTES:

A) NO STANDARD APPLIES TO THIS PACKAGE
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSION
D) DRAWING FILENAME AND REVSION : MKT-MFP04AREV2.
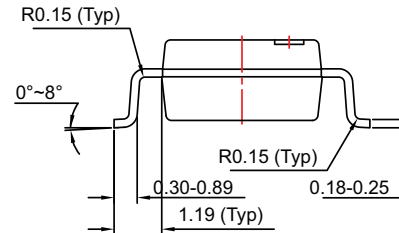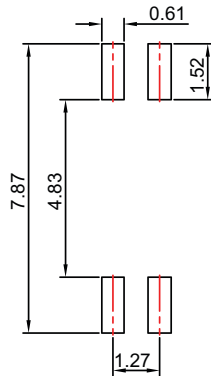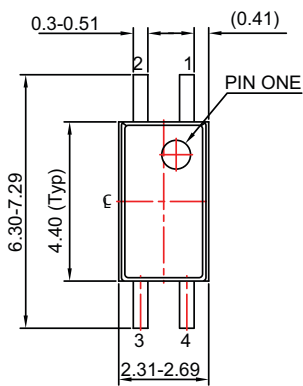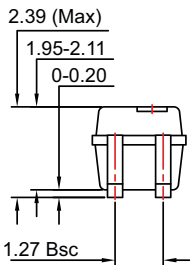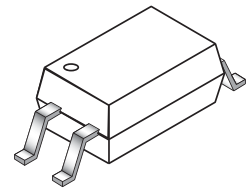
8 Lead, SOIC, .150" Body, Opto, White
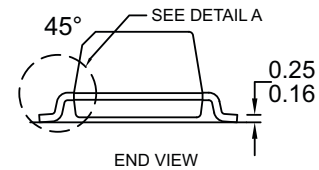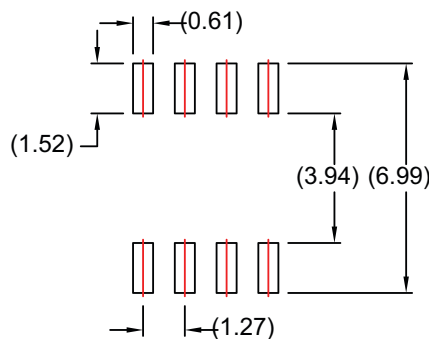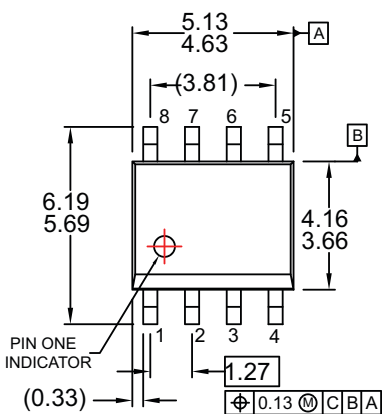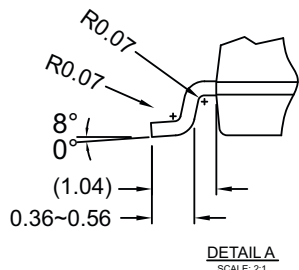
5.13
4.63
(3.81)
6.19
5.69
4.16
3.66
PIN ONE INDICATOR
(0.33)
1.27
0.13 M C B A

(0.61)
(1.52)
(3.94) (6.99)
(1.27)
LAND PATTERN RECOMMENDATION

0.20
0.08
3.63 MAX
0.53
0.28 8X
0.10 C
45° SEE DETAIL A
0.25
0.16
END VIEW

R0.07
R0.07
8°
0°
(1.04)
0.36~0.56
DETAIL A
SCALE: 2:1

NOTES:

A) NO STANDARD APPLIES TO THIS PACKAGE
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
D) LANDPATTERN STANDARD: SOIC127P600X175-8M.
E) DRAWING FILENAME: MKT-M08EREV4
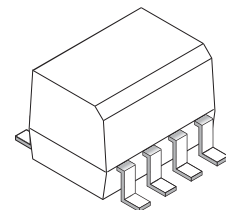
Refer to datasheet for package dimensions for a specific product.

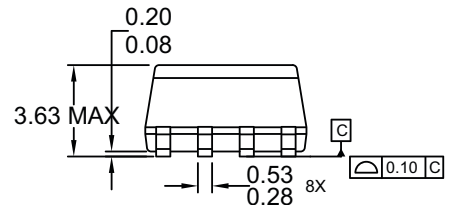| Application Notes	
AN-3001	Optocoupler Input Drive Circuits
AN-3002	Low Current Input Circuit Ideas
AN-3003	Applications of Non Zero Crossing Triac Drivers Featuring the MOC3011
AN-3004	Applications of Zero Voltage Crossing Optically Isolated Triac Drivers
AN-3005	Design Fundamentals for Phototransistor Circuits
AN-3006	Optically Isolated Phase Controlling Circuit Solution
AN-3007	MID400 Power Line Monitor
AN-3008	RC Snubber Networks for Thyristor Power Control and Transient Suppression
AN-3010	Using the QVE00033 Surface Mount Phototransistor Optical Interrupter Switch
AN-3011	Surface Mounting Technology Assembly Guidelines for Fairchild's Microcouplers™ (Ball Grid Array)

For additional application notes, please visit www.fairchildsemi.com/apnotes/

Cross Reference Information:

For product cross reference information, please visit www.fairchildsemi.com/crossref/crossref.do

Term	Symbol	Unit	Definition
	BV_{CBO}	V	Minimum collector to base breakdown voltage with the emitter open
Breakdown Voltage	BV_{CEO}	V	Minimum collector to emitter breakdown voltage with the base open
	BV_{ECO}	V	Minimum emitter to collector breakdown voltage with the base open
Common Mode Rejection or Common Mode Transient Immunity	CMR	kV/µs	A measure of the optocoupler's ability to reject unwanted noise and retain the integrity of the desired signal
Critical Voltage Rise Rate	dv/dt	V/µs	Critical rate of rise of off-state voltage
Current Transfer Ratio	CTR	%	Ratio of the collector current to the diode forward current (I_C/I_F)
	$I_{(OFF) RMS}$	mA	Off-state RMS input current
	$I_{(ON) RMS}$	mA	On-state RMS input current
	I_{CC}	mA	Operating supply current
	I_{CCL}	mA	Logic low supply current
	I_{DRM}	nA, µA	Peak blocking current, either direction
	$I_{F(ON)}$	mA	On-state LED threshold current
	I_{FT}	mA	LED trigger current
Current	I_{FLH}	mA	LED threshold current, low to high
	I_{H}	µA	Holding current
	I_{L}	mA	Load current
	I_{LMT}	mA	Current limit
	I_{OH}	A, mA or µA	Logic high output current
	I_{OL}	A, mA or µA	Logic low output current
	I_{TH-}	mA	Minimum input threshold current
	I_{TH+}	mA	Maximum input threshold current
Data Rate	Data Rate	Mbps	Number of physically transferred bits per second over a communication link
Operating Temperature Range	T_{OPR}	°C	Temperature range for which operating specifications are valid
Pulse Width Distortion	PWD	ns	Difference between tPHL and tPLH
Reference Voltage Tolerance	V_{REF} Tolerance	%	Reference voltage range defined as % of the typical V_{REF} value

Term	Symbol	Unit	Definition
Resistance	$R_{(ON)}$	Ω	On-state output resistance
Switching Characteristics	t_{OFF}	µs	Turn-off switching time
	t_{ON}	µs	Turn-on switching time
	t_{PHL}	µs or ns	Propagation delay time to logic high output
	t_{PLH}	µs or ns	Propagation delay time to logic low output
	t_r	µs or ns	Time delay between the 10% and 90% point on the rising edge
	t_f	µs or ns	Time delay between the 10% and 90% point on the falling edge
Voltage	$V_{I(OFF)\ RMS}$	V	Off-state RMS input voltage
	$V_{I(ON)\ RMS}$	V	On-state RMS input voltage
	V_{CC}	V	Operating supply voltage
	V_{HL}	V	Threshold input voltage high to low
	V_{DRM}	V	Off-state output terminal voltage
	V_{INH}	V	Inhibit voltage - voltage above which the output will not trigger on
	V_{ISO}	$V_{AC(rms)}$	Isolation voltage rating for a one (1) minute duration
	V_{OH}	V	Logic high output voltage
	V_{OL}	V	Logic low output voltage
	V_{OPR}	V	Operating voltage range
	V_{REF}	V	Reference voltage
	V_{TM}	V	On-state voltage
	V_{UVLO-}	V	Undervoltage lockout negative-going threshold
	V_{UVLO+}	V	Undervoltage lockout positive-going threshold

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| **PRODUCTS & SAMPLES** | APPLICATIONS | DESIGN SUPPORT | COMPANY |

POWER MANAGEMENT ICs

AC-DC: Power Factor Correction

- Continuous Conduction Mode (CCM) PFC Controllers
- Critical (CrCM) / Boundary Conduction Mode (BCM) PFC Controllers
- PFC + PWM Combination (Combo) Controllers

Digital Power Solutions

- Digital Power Controllers
- Digital Power Converters
- Digital Power Support Drivers

Isolated DC-DC

- Green-Mode PWM Controllers
- Integrated Green-Mode PWM Regulators (Green FPS™)
- Integrated PWM Regulators (FPS™)
- Primary-side only CV/CC Controllers
- Standard SMPS PWM Controllers

Non-Isolated DC-DC

- Charge-Pump Converters
- Multi-phase Controllers
- Step-down Controllers (External Switch)
- Step-down Regulators (Integrated Switch)
- Step-up Regulators (Integrated Switch)

Power Drivers

- High Voltage Gate Drivers (HVIC)
- Low-Side Gate Drivers
- Synchronous Rectifier Controllers/Drivers
- Synchronous-Buck/Multi-phase Drivers

Supervisory/Monitor ICs

- Ground Fault Interrupt (GFI) Controllers
- Supervisors + PWM
- Temperature Sensors
- Voltage Supervisors/Detectors/Stabilizers

Voltage Regulators

- LDOs
- Positive Voltage Linear Regulators
- Negative Voltage Linear Regulators
- Shunt Regulators

POWER SEMICONDUCTORS

Diodes & Rectifiers

- Bridge Rectifiers
- Rectifiers
- Schottky Diodes and Rectifiers
- Small Signal Diodes
- Transient Voltage Suppressors
- Zener Diodes

IGBTs

- Discrete IGBTs
- IGBT Modules

Integrated Power Solutions

- DrMOS FET Plus Driver Multi-Chip Module
- IGBT Module
- Full Function Load Switches (IntelliMAX™)
- MOSFET/Schottky Combos
- Smart Power Modules (SPM®)
- Smart Switches

MOSFETs

- Discrete MOSFETs
- Full Function Load Switches (IntelliMAX™)
- MOSFET/Schottky Combos

Transistors

- BJTs
- Discrete IGBT
- JFETs
- Load Switches
- MOSFETs
- MOSFET/Schottky Combos
- Small Signal Transistors

TRIACs

- TRIACs

LIGHTING AND DISPLAY

- CCFL Ballast IC
- CFL/Lighting Ballast Control IC
- Critical (CrCM)/Boundary Conduction Mode (BCM) PFC Controllers for Lighting
- High Voltage Gate Drivers (HVIC)
- LED Drivers
- PDP Smart Power Module (PDP-SPM™)

SIGNAL PATH ICs

Amplifiers & Comparators

- Audio Amplifiers
- Comparators
- Current Sense Amplifier
- High Performance Amplifiers (>15MHz)
- Operational Amplifiers

Signal Conversion

- Triple Video DACs
- Video Filter Drivers
- Video Switch Matrix/Multiplexers

Interface

- LVDS
- Serializer/Deserializer (µSerDes™)
- USB Transceiver

Switches

- Analog/Audio Switches
- Bus Switches
- USB Switches
- Video Switches

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- Buffers, Drivers, Transceivers
- Flip flops, Latches, Registers
- Gates
- MSI Functions
- Multiplexer/Demultiplexer Encoders/Decoders
- Specialty Logic
- TinyLogic®
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