FEELING Technology

FP5138

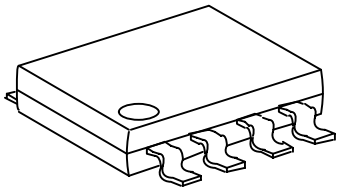
BOOST CONVERT CONTROL IC

GENERAL DESCRIPTION

The FP5138 is a boost topology switching regulator control IC for battery-used applications field. The FP5138 includes a totem-pole single output stage for driving NPN transistor, high precision reference (0.5V) for comparing output voltage with feedback amplifier, an internal dead-time control for controlling the minimum duty cycle, programmable soft start with short circuit protection function and logic level control for operating mode or standby mode.

FEATURES

- Wide supply voltage operating range: 1.8 to 15V
- Low current consumption: Operation Mode 5.5mA
  Standby-by Mode 1μA
- High speed oscillator frequency: 1MHz max.
- Programmable Soft Start function (SS)
- Short Circuit Protection function(SCP)
- Totem-pole output with adjustable on/off current (for NPN transistors)
- Logic level control stand-by mode function
- Package: SOP8



SOP8

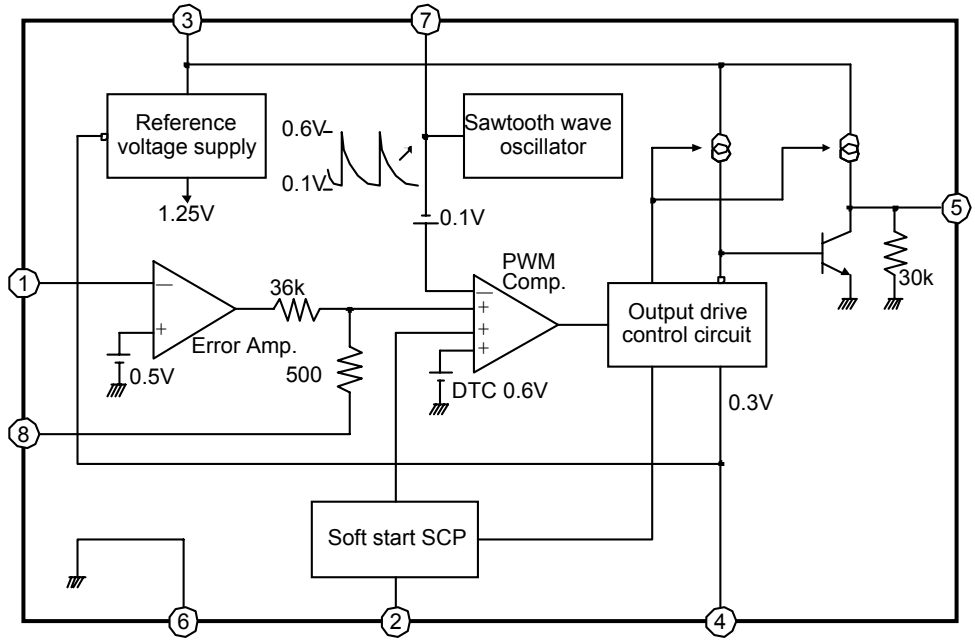
TYPICAL APPLICATION

- Digital Camera
- PDA
- Portable Equipment

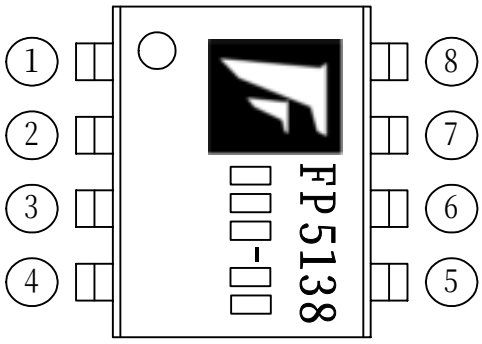
ORDER INFORMATION

Part Number	Operating Temperature	Package	Description
FP5138D	0°C ~ +70°C	SOP8	Tube
FP5138DR	0°C ~ +70°C	SOP8	Tape & Reel

FUNCTIONAL BLOCK DIAGRAM



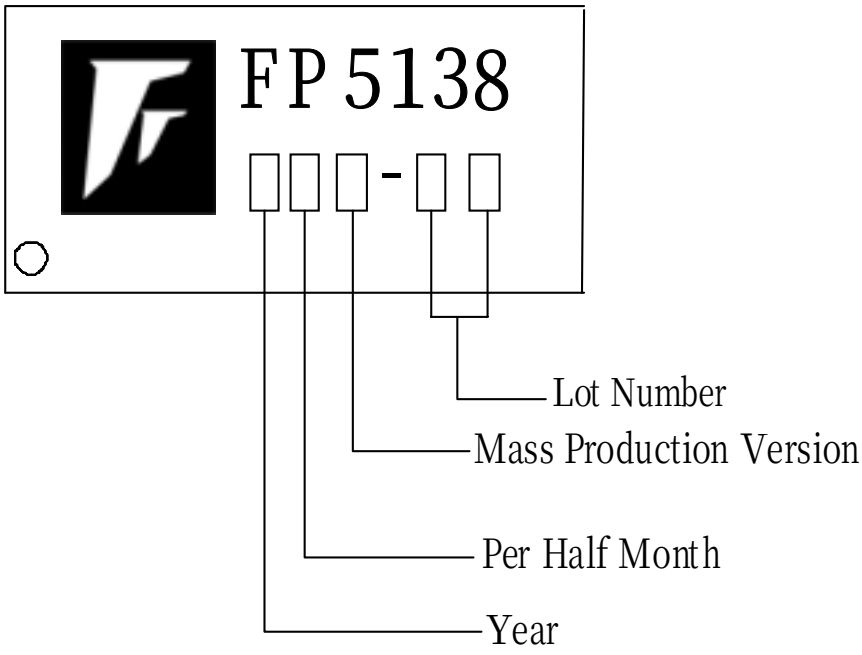
MARK VIEW



PIN DESCRIPTION

Name	No.	I/O	Description
FB	1	I	Error amplifier inverting input pin
SCP	2	I	Connected a capacitor Soft start and SCP function pin
V_{CC}	3	P	IC power supply
BR/CTL	4	I	Output current setting and control pin
OUT	5	O	Totem-pole output
GND	6	P	IC ground
OSC	7	I	Capacitor and resistor connected for the frequency of oscillation
COMP	8	O	Error amplifier compensation output

IC DATE CODE DISTINGUISH

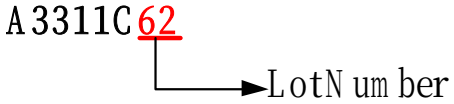


FOR EXAMPLE:

January	A (Front Half Month), B (Last Half Month)	
February	C, D	
March	E, F	----------And so on

Lot Number is the last two numbers

For Example:



ABSOLUTE MAXIMUM RATINGS

Power supply voltage---------- 15V
Output source current---------- -50mA
Output sink current---------- 50mA
Allowable dissipation
Sop-8
Ta≦+25℃---------- 570mW
Operating temperature---------- -30℃ +85℃
Storage temperature----------55℃ +125℃

DC ELECTRICAL CHARACTERISTICS

Vcc undervoltage lockout section(U.V.L.O)

Parameter	Symbol	Test Condition	MIN	TYP	MAX	Unit
Reset voltage for falling Vcc.	V_R	--	-	-	0.9	V
Startup voltage for rising Vcc.	V_{TH}	--	1.1	1.3	1.5	V

Soft start section

Parameter	Symbol	Test Condition	MIN	TYP	MAX	Unit
Charging current	I_{cs}	Vscp=0V	-1.5	-1.0	-0.7	V
Voltage at soft start completion	V_{ts}	--	07	0.8	0.9	V

Short circuit detection (S.C.P) section

Parameter	Symbol	Test Condition	MIN	TYP	MAX	Unit
Charging current	I_{CPC}	Vscp=0V	-1.5	-1.0	-0.7	μA
Threshold voltage	V_{tPC}	--	0.7	0.8	0.9	V

Sawtooth wave oscillator(OSC) section

Parameter	Symbol	Test Condition	MIN	TYP	MAX	Unit
Oscillation frequency	f_{OSC}	R_T=3.0KΩ,C_T=270PF	400	500	600	kHz
Frequency input Stability	$f_{\Delta V}$	Vcc=2V to 15V	-	2	10	%
Frequency variation with temperature	$f_{\Delta T}$	Ta = 0℃to 85℃	-	5	-	%

Error amplifier section

Parameter	Symbol	Test Condition	MIN	TYP	MAX	Unit
Input threshold voltage	V_T	V_{FB}=450mV	480	500	520	mV
V_T input stability	$V_{T\Delta V}$	Vcc=2V to 12V	-	5	20	mV
V_T variation with Temperature	$V_{T\Delta T}$	Ta = 0℃to 85℃	-	1	-	%
Input bias current	I_B	--	-1.0	-0.2	1.0	μA
Voltage Gain	Av		70	100	145	V/V
Frequency bandwidth	BW	Av=0 bB	-	6	-	MHz
Maximum output voltage range	V_{OM+}	--	0.78	0.87	-	V
	V_{OM-}		-	0.05	0.2	
Output source current	I_{OM+}	V_{FB}=450mV	-	-40	-24	μA
Output sink current	I_{OM-}		24	40	-	μA

Idle period adjustment section

Parameter	Symbol	Test Condition	MIN	TYP	MAX	Unit
Maximum duty cycle	T_{DUTY}	R_T=3.0kΩ, C_T=270pF, V_{FB}=0.8V	75	-	85	%

Output section

Parameter	Symbol	Test Condition	MIN	TYP	MAX	Unit
Output voltage	V_{OH1}	R_B=390Ω, I_O=-15mA	1.0	1.2	-	V
Output voltage	V_{OH2}	R_B=750Ω, I_O=-10mA, Vcc= 1.8V	0.8	1.0	-	V
Output voltage	V_{OL1}	R_B=390Ω, I_O=15mA	-	0.1	0.2	V
Output voltage	V_{OL2}	R_B=750Ω, I_O=10mA, Vcc= 1.8V	-	0.1	0.2	V
Output source current	I_{O+}	R_B=390Ω, Vo=0.9V	-	-52	-20	mA
Output sink current	V_{OL1}	R_B=390Ω, Vo=0.3V	30	45	-	mA
Pull down resistance	R_O	--	20	30	40	kΩ

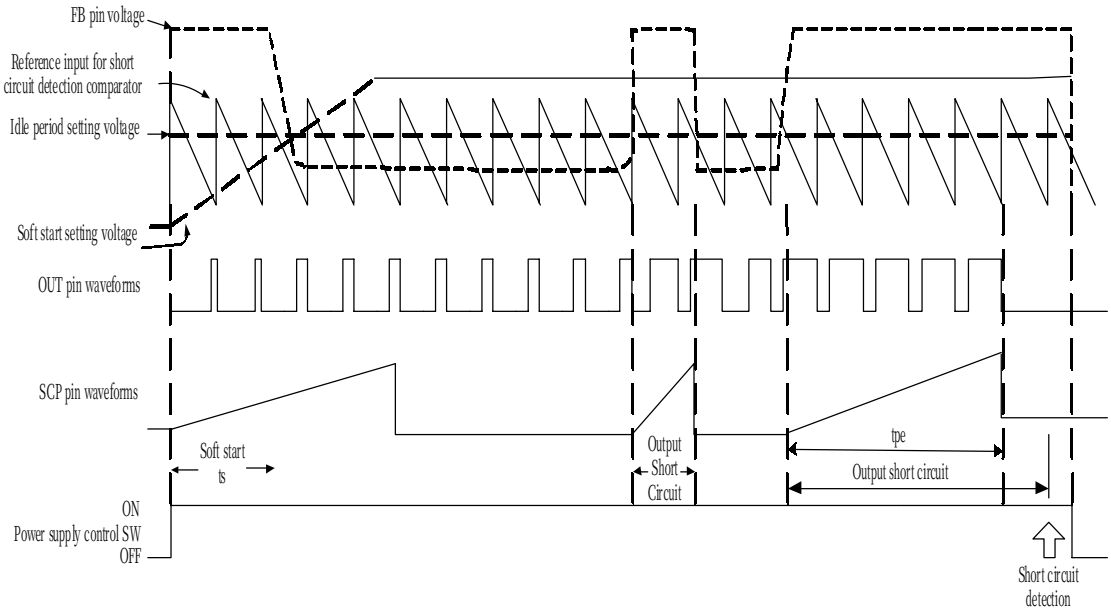
Output current setting section/ Control section

Parameter	Symbol	Test Condition	MIN	TYP	MAX	Unit
Pin voltage	V_{BR}	R_B=390Ω	0.2	0.3	0.4	V
Input off condition	I_{OFF}	--	-20	-	0	μA
Input on condition	I_{ON}	--	-	-	-45	μA
Pin current range	I_{BR}	--	-1.8	-	-0.1	mA

Entire device section

Parameter	Symbol	Test Condition	MIN	TYP	MAX	Unit
Stand-by current	Iccs	BR/CTL pin open or Vcc	-	-	1	μA
Average supply current	Icc	R_B=390Ω, Vcc=0 ~ 20V	-	5.5	10	mA

Timing Chart



TYPICAL CHARACTERISTICS

Supply voltage vs. Supply current

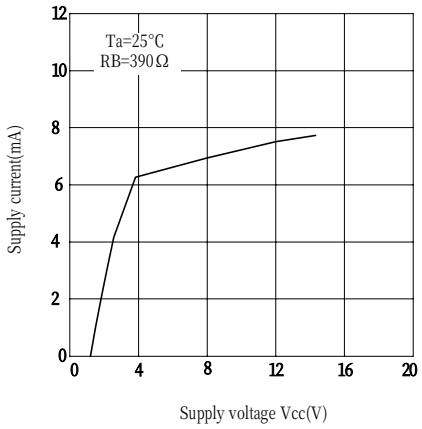


Figure 1

Supply voltage vs. Input threshold voltage

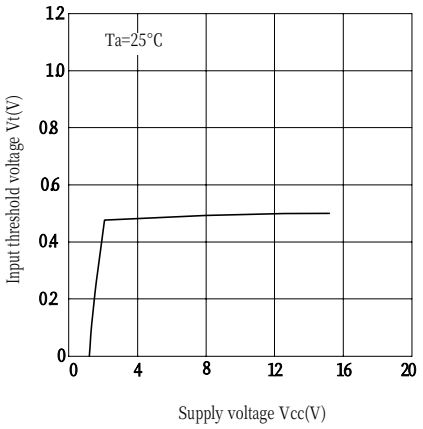


Figure 2

Ambient temperature vs. Input threshold voltage variation ratio

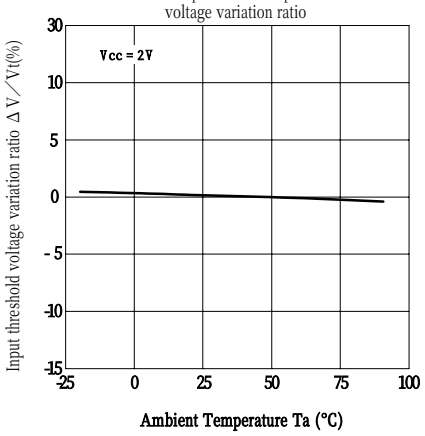


Figure 3

High level output

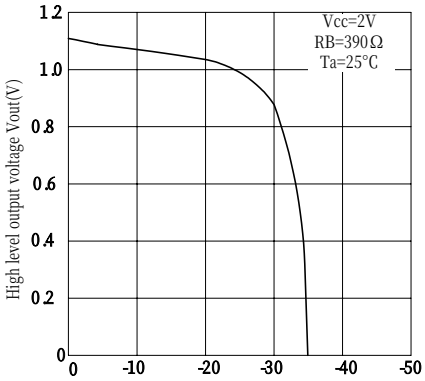


Figure 4

Low level output

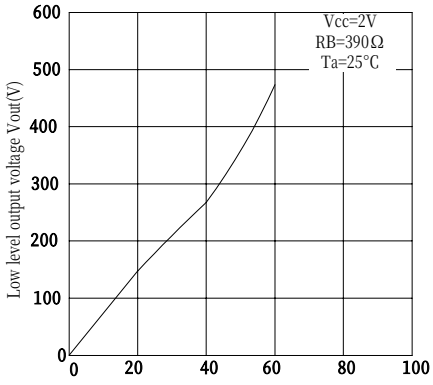


Figure 5

BR/CTL pin current vs. Output source current

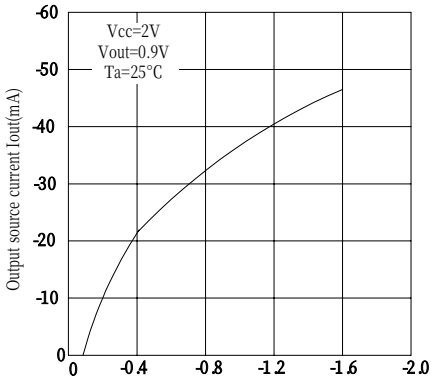


Figure 6

BR/CTL pin current vs. BR/CTL pin voltage

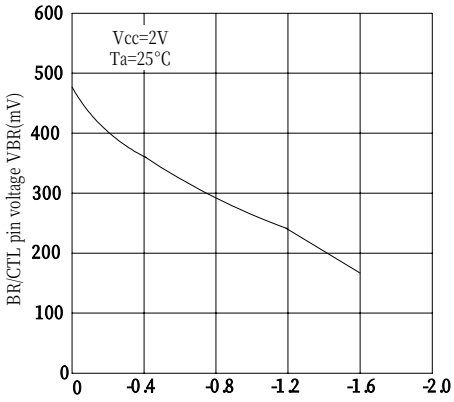


Figure 7

BR/CTL pin current vs. Supply current

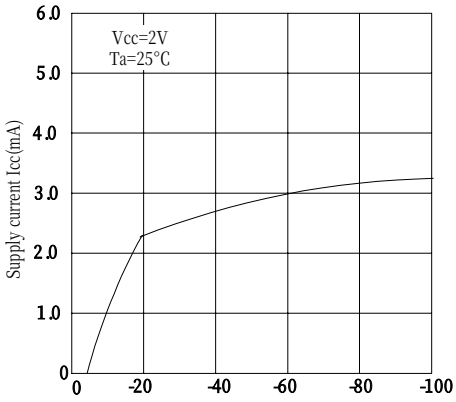
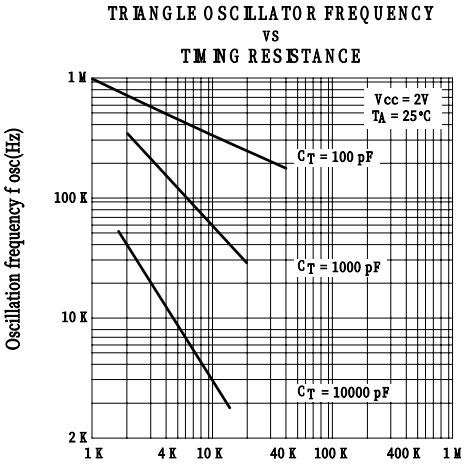


Figure 8



Supply voltage vs. Frequency variation ratio

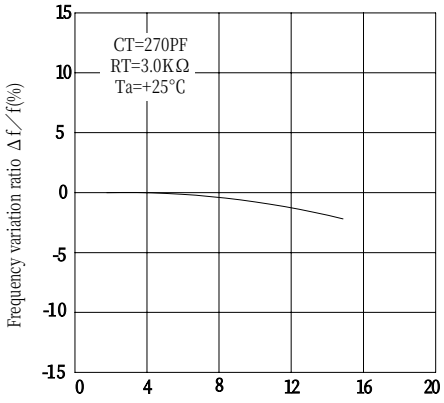


Figure 10

Ambient temperature vs. Frequcney variation ratio

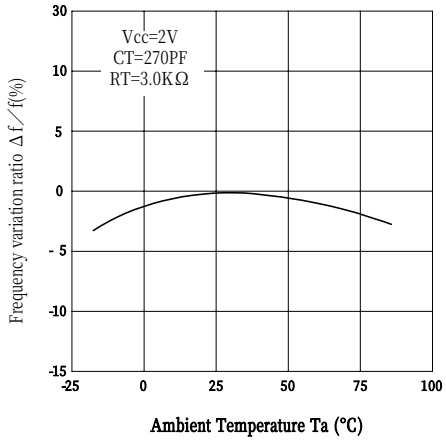
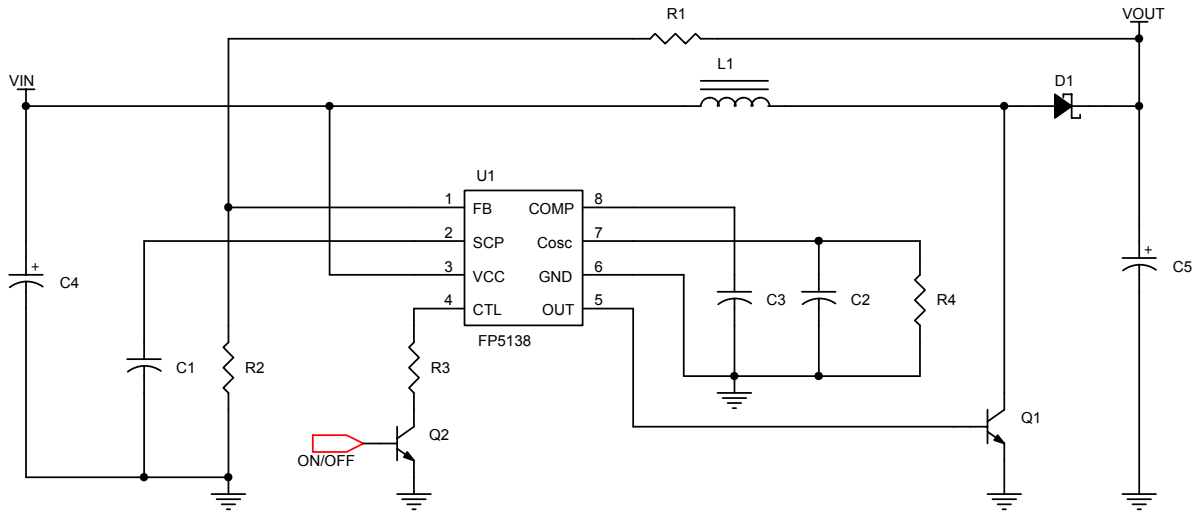
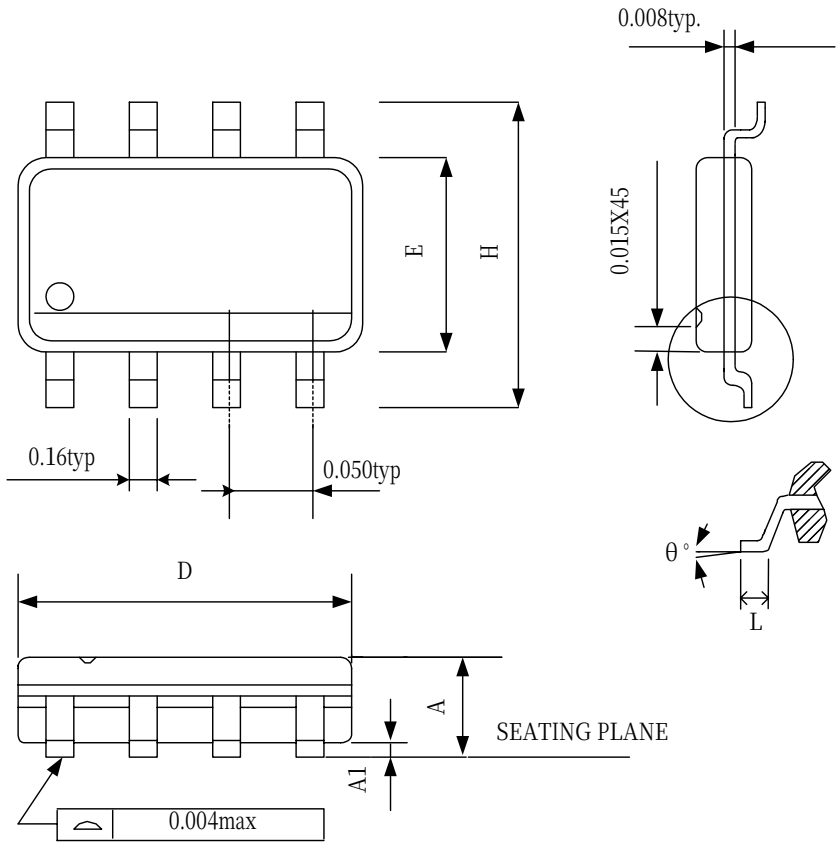


Figure 11

APPLICATION NOTE



PACKAGE OUTLINE



SYMBOLS	MIN	MAX
A	0.053	0.069
A1	0.004	0.010
D	0.189	0.196
E	0.150	0.157
H	0.228	0.244
L	0.016	0.050
θ °	0	8

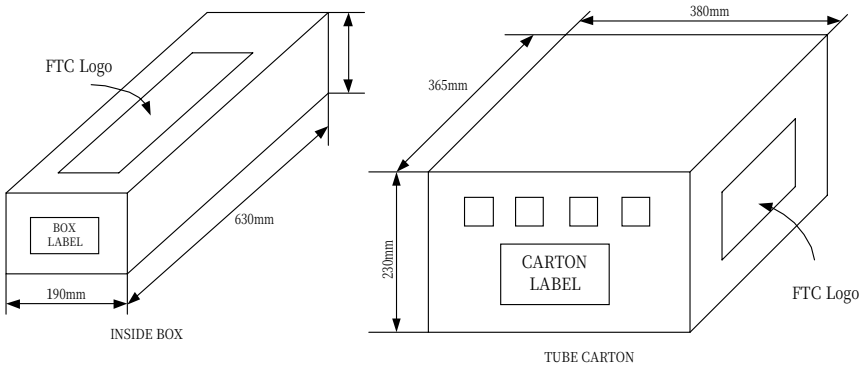
NOTE:

1. JEDEC OUTLINE:MS-012 AA
2. DIMENSIONS “D” DOES NOT INCLUDE MOLD FLASH,PROTRUSIONS OR GATE BURRS.MOLD FLASH,PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED .15mm (.0.06in) PER SIDE
3. DIMENSIONS “E” DOES NOT INCLUDE INTER-LEAD FLASH,OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED .25mm (.0.10in) PER SIDE.

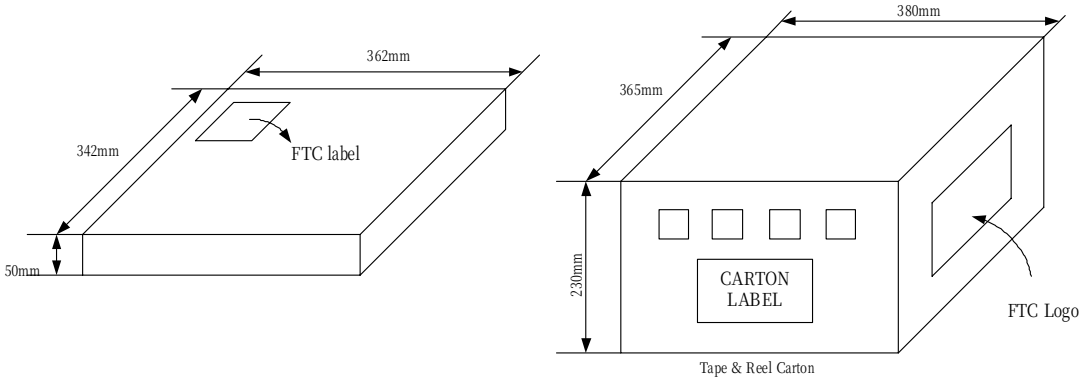
PACKING SPECIFICATIONS

BOX DIMENSION

TUBE INSIDE BOX AND CARTON



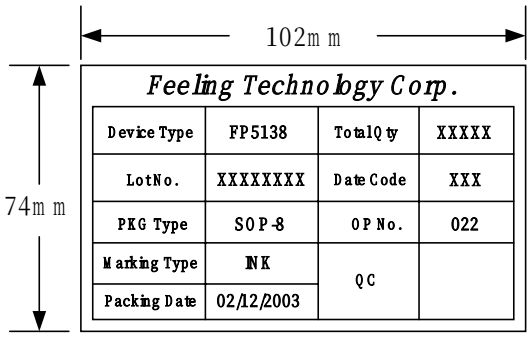
TAPE AND REEL INSIDE BOX AND CARTON



PACKING QUANTITY SPECIFICATIONS

50 EA/TUBE	2500 EA / REEL
50 TUBES / INSIDE BOX	4 INSIDE BOXES / CARTON
4 INSIDE BOXES / CARTON	

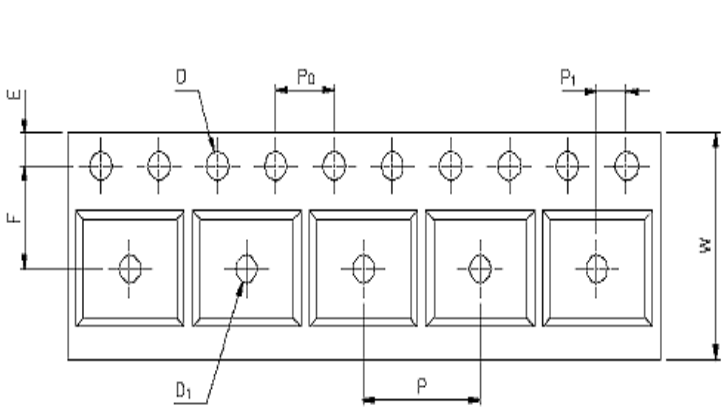
LABEL SPECIFICATIONS

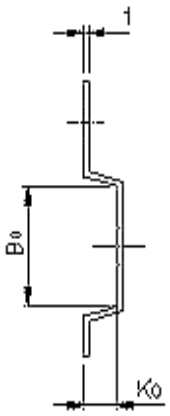


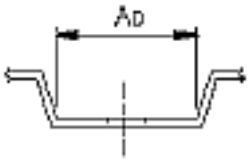
CARRIER TAPE DIMENSIONS

APPLICATION	W	P	E	F	D	D_1
SOP8	$12.0^{+0.3}_{-0.1}$	8.0±0.1	1.75±0.1	5.5±0.1	1.55±0.1	$1.5^{+0.25}$

APPLICATION	P_0	P_1	A_0	B_0	K_0	t
SOP8	4.0±0.1	2.0±0.1	6.4±0.1	5.20±0.1	2.1±0.10	0.30±0.013





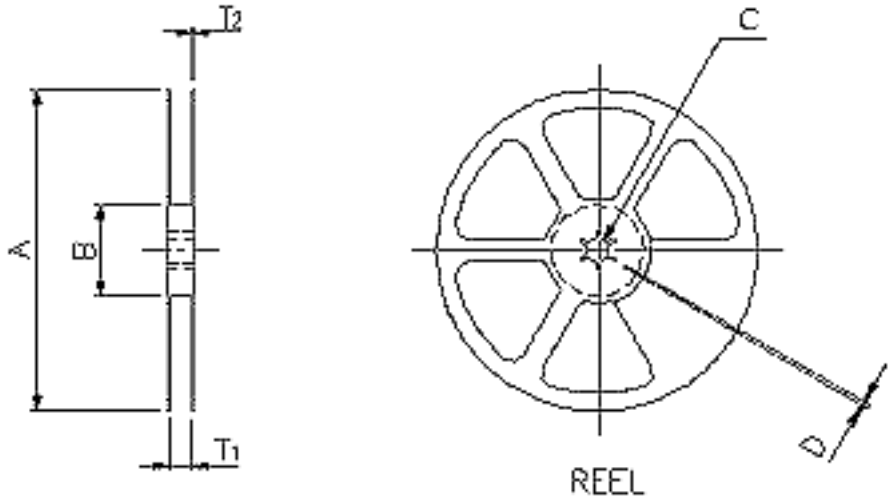


COVER TAPE DIMENSIONS

CARRIER WIDTH	12	16	24
COVER TAPE WIDTH	9.3	13.3	21.3

(mm)

REEL DIMENISIONS



APPLICATION	MATERIAL	A	B	C	D	T_1	T_2
SOP8	PLASTIC REEL (WHILE)	330±0.1	62±1.5	12.75+0.15	2+0.6	12.4+0.2	2.0+0.2