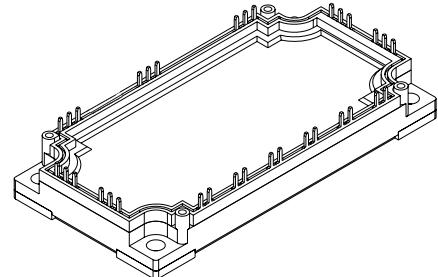
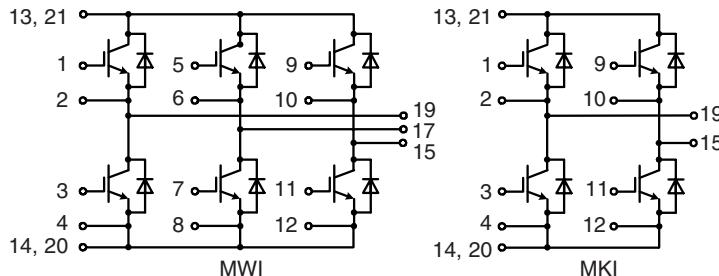


# IGBT Modules

## Sixpack, H Bridge

Short Circuit SOA Capability  
Square RBSOA

$I_{C25}$  = 165 A  
 $V_{CES}$  = 1200 V  
 $V_{CE(sat)\text{ typ.}}$  = 2.0 V



### IGBTs

Symbol	Conditions	Maximum Ratings		
$V_{CES}$	$T_{VJ} = 25^\circ\text{C}$ to $150^\circ\text{C}$	1200		V
$V_{GES}$		$\pm 20$		V
$I_{C25}$	$T_C = 25^\circ\text{C}$	165		A
$I_{C80}$	$T_C = 80^\circ\text{C}$	115		A
$I_{CM}$	$V_{GE} = \pm 15 \text{ V}$ ; $R_G = 12 \Omega$ ; $T_{VJ} = 125^\circ\text{C}$	200		A
$V_{CEK}$	RBSOA; clamped inductive load; $L = 100 \mu\text{H}$		$V_{CES}$	
$t_{sc}$	$V_{CE} = 900 \text{ V}$ ; $V_{GE} = \pm 15 \text{ V}$ ; $R_G = 12 \Omega$ ; $T_{VJ} = 125^\circ\text{C}$ SCSOA; non-repetitive	10		$\mu\text{s}$
$P_{tot}$	$T_C = 25^\circ\text{C}$	640		W

Symbol	Conditions	Characteristic Values		
		( $T_{VJ} = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{CE(\text{sat})}$	$I_C = 100 \text{ A}$ ; $V_{GE} = 15 \text{ V}$ ; $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$	2.0	2.5	V
		2.3		V
$V_{GE(\text{th})}$	$I_C = 4 \text{ mA}$ ; $V_{GE} = V_{CE}$	4.5		V
$I_{CES}$	$V_{CE} = V_{CES}$ ; $V_{GE} = 0 \text{ V}$ ; $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$		1.4	mA
$I_{GES}$	$V_{CE} = 0 \text{ V}$ ; $V_{GE} = \pm 20 \text{ V}$		400	nA
$t_{d(on)}$ $t_r$ $t_{d(off)}$ $t_f$ $E_{on}$ $E_{off}$	Inductive load, $T_{VJ} = 125^\circ\text{C}$ $V_{CE} = 600 \text{ V}$ ; $I_C = 100 \text{ A}$ $V_{GE} = \pm 15 \text{ V}$ ; $R_G = 12 \Omega$	330		ns
		15		ns
		750		ns
		45		ns
		12		mJ
		10		mJ
$C_{ies}$ $Q_{Gon}$	$V_{CE} = 25 \text{ V}$ ; $V_{GE} = 0 \text{ V}$ ; $f = 1 \text{ MHz}$ $V_{CE} = 600 \text{ V}$ ; $V_{GE} = 15 \text{ V}$ ; $I_C = 150 \text{ A}$	7.4		nF
		0.76		$\mu\text{C}$
$R_{thJC}$	(per IGBT)		0.19	K/W

### Features

- NPT<sup>3</sup> IGBTs
  - low saturation voltage
  - positive temperature coefficient for easy paralleling
  - fast switching
  - short tail current for optimized performance also in resonant circuits
- HiPerFRED™ diode:
  - fast reverse recovery
  - low operating forward voltage
  - low leakage current
- Industry Standard Package
  - solderable pins for PCB mounting
  - isolated copper base plate

### Typical Applications

- MWI
  - AC drives
  - power supplies with power factor correction
- MKI
  - motor control
    - . DC motor amature winding
    - . DC motor excitation winding
    - . synchronous motor excitation winding
  - supply of transformer primary winding
  - . power supplies
  - . welding
  - . X-ray
  - . battery charger

## Diodes

Symbol	Conditions	Maximum Ratings		
I <sub>F25</sub>	T <sub>C</sub> = 25°C	200	A	
I <sub>F80</sub>	T <sub>C</sub> = 80°C	130	A	

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
V <sub>F</sub>	I <sub>F</sub> = 100 A; V <sub>GE</sub> = 0 V; T <sub>VJ</sub> = 25°C T <sub>VJ</sub> = 125°C	2.3 1.7	2.6 V	V
I <sub>RM</sub> t <sub>rr</sub>	I <sub>F</sub> = 120 A; dI <sub>F</sub> /dt = -750 A/μs; T <sub>VJ</sub> = 125°C V <sub>R</sub> = 600 V; V <sub>GE</sub> = 0 V	58 190	A ns	
R <sub>thJC</sub>	(per diode)		0.3	K/W

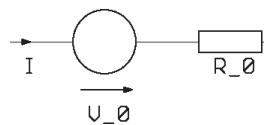
## Module

Symbol	Conditions	Maximum Ratings		
T <sub>VJ</sub>	operating	-40...+125	°C	
T <sub>JM</sub>		+150	°C	
T <sub>stg</sub>		-40...+125	°C	
V <sub>ISOL</sub>	I <sub>ISOL</sub> ≤ 1 mA; 50/60 Hz	2500	V~	
M <sub>d</sub>	Mounting torque (M5)	3 - 6	Nm	

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
R <sub>pin-chip</sub>		1.8	mΩ	
d <sub>s</sub> d <sub>A</sub>	Creepage distance on surface Strike distance in air	10 10	mm mm	
R <sub>thCH</sub>	with heatsink compound	0.01	K/W	
Weight		300	g	

## Equivalent Circuits for Simulation

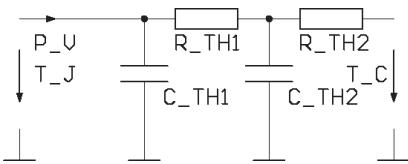
## Conduction



IGBT (typ. at V<sub>GE</sub> = 15 V; T<sub>J</sub> = 125°C)  
V<sub>o</sub> = 0.95 V; R<sub>o</sub> = 14 mΩ

Free Wheeling Diode (typ. at T<sub>J</sub> = 125°C)  
V<sub>o</sub> = 1.27V; R<sub>o</sub> = 4.3 mΩ

## Thermal Response



## IGBT (typ.)

$$C_{th1} = 0.389 \text{ J/K}; R_{th1} = 0.139 \text{ K/W}$$

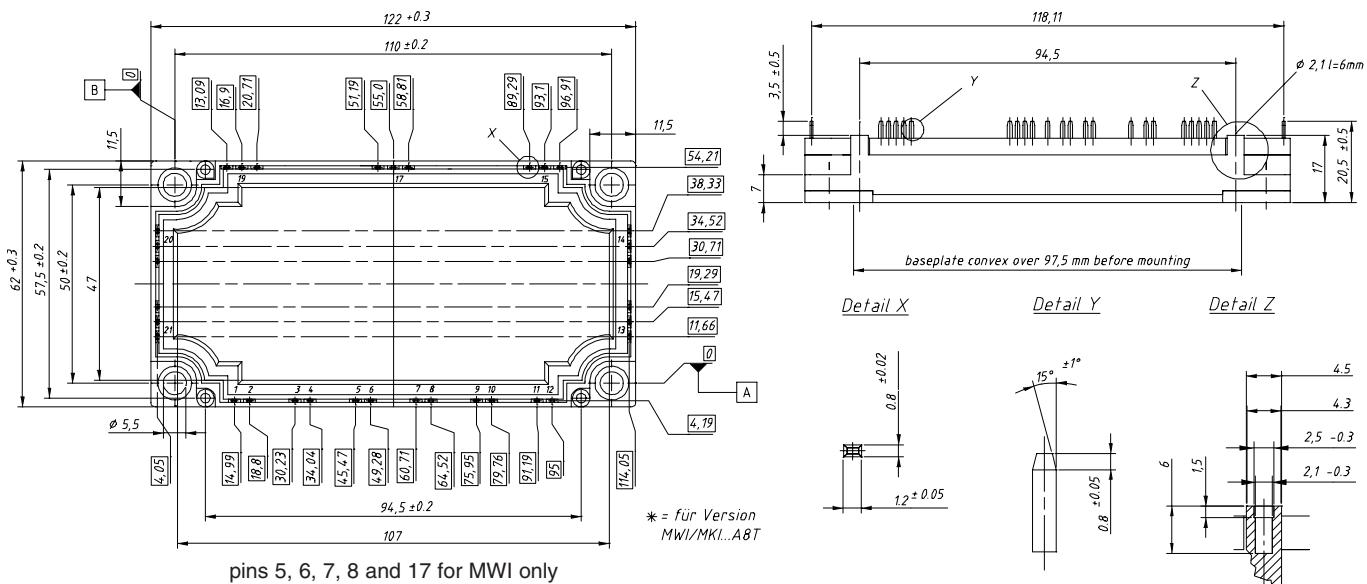
$$C_{th2} = 2.154 \text{ J/K}; R_{th2} = 0.051 \text{ K/W}$$

## Free Wheeling Diode (typ.)

$$C_{th1} = 0.301 \text{ J/K}; R_{th1} = 0.24 \text{ K/W}$$

$$C_{th2} = 2.005 \text{ J/K}; R_{th2} = 0.062 \text{ K/W}$$

## Dimensions in mm (1 mm = 0.0394")



IXYS reserves the right to change limits, test conditions and dimensions.

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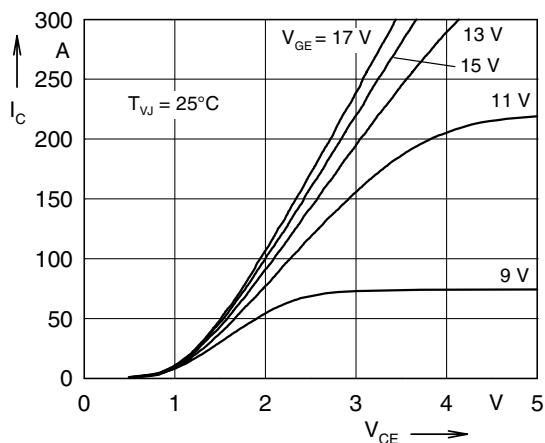


Fig. 1 Typ. output characteristics

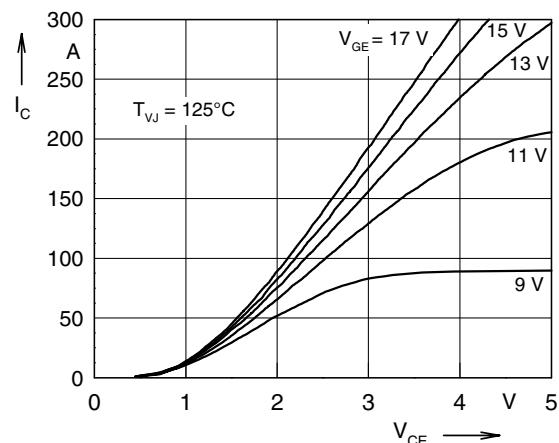


Fig. 2 Typ. output characteristics

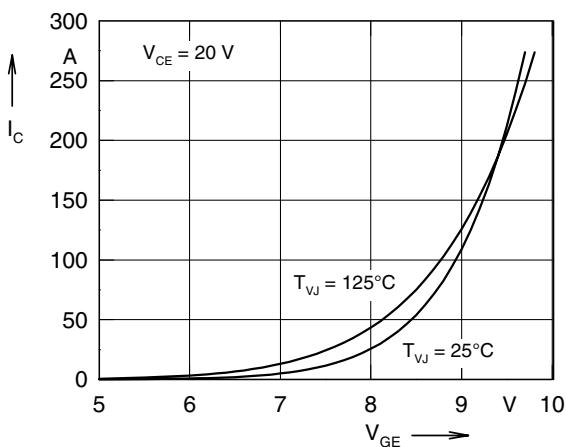


Fig. 3 Typ. transfer characteristics

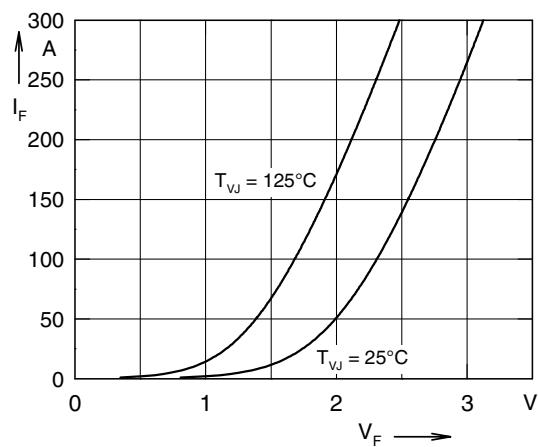


Fig. 4 Typ. forward characteristics  
of free wheeling diode

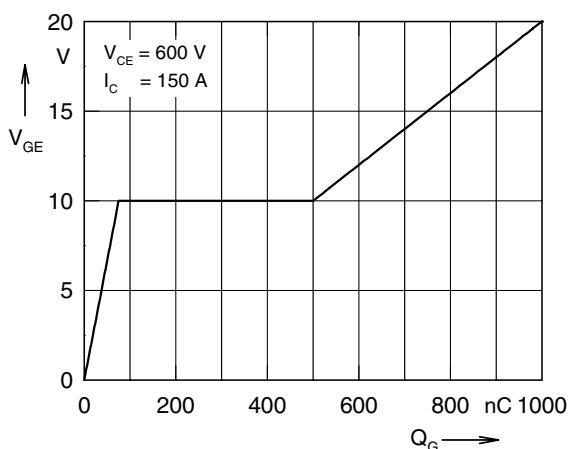


Fig. 5 Typ. turn on gate charge

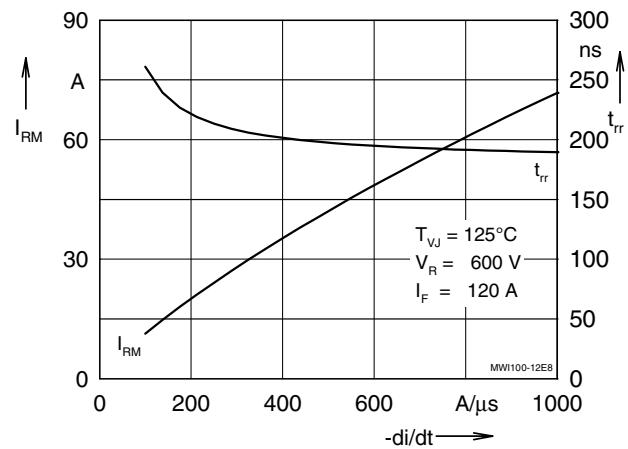


Fig. 6 Typ. turn off characteristics  
of free wheeling diode

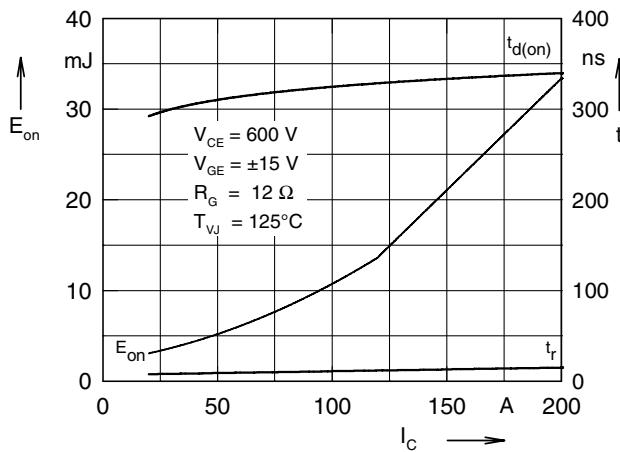


Fig. 7 Typ. turn on energy and switching times versus collector current

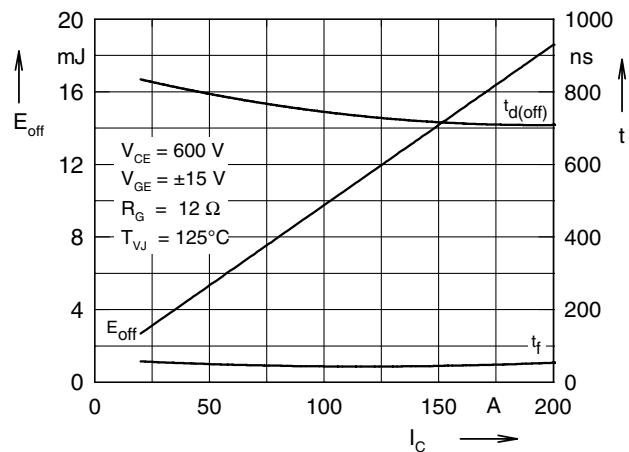


Fig. 8 Typ. turn off energy and switching times versus collector current

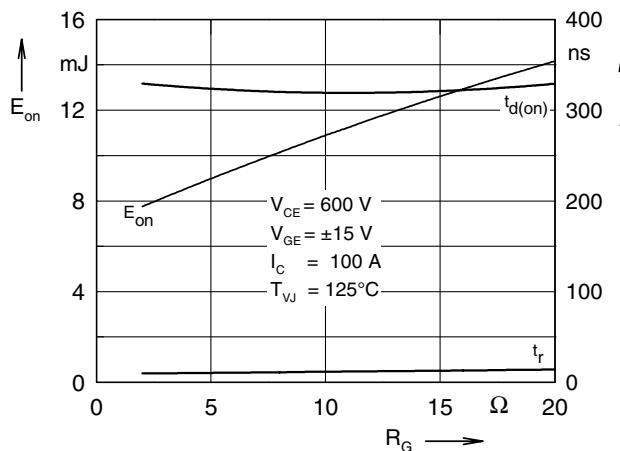


Fig. 9 Typ. turn on energy and switching times versus gate resistor

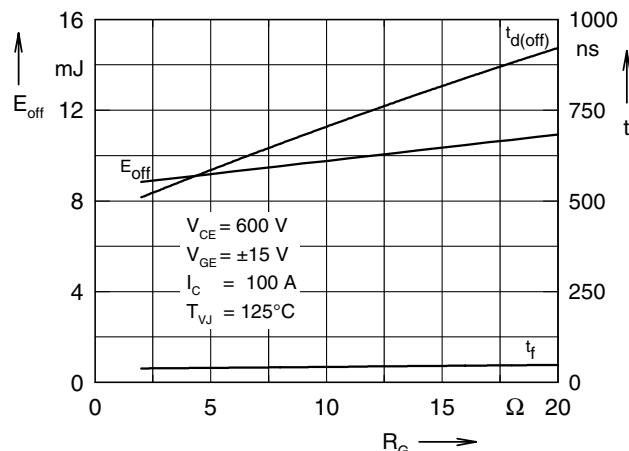


Fig.10 Typ. turn off energy and switching times versus gate resistor

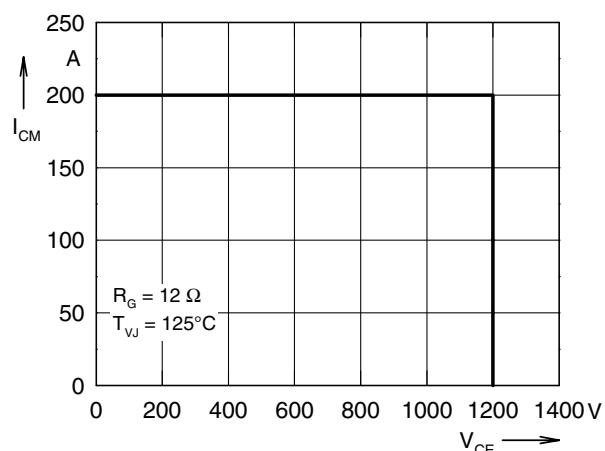


Fig. 11 Reverse biased safe operating area RBSOA

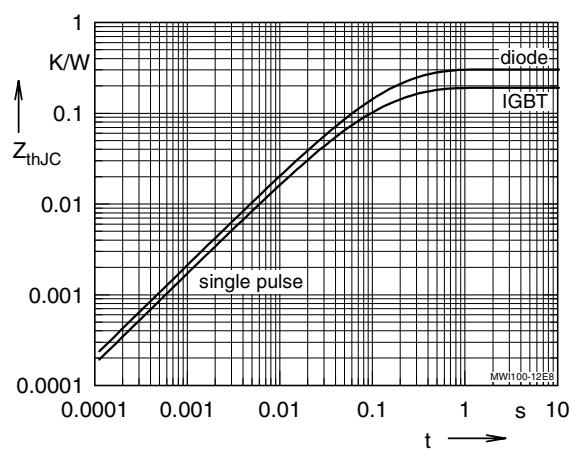


Fig. 12 Typ. transient thermal impedance