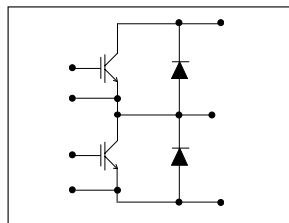


Features

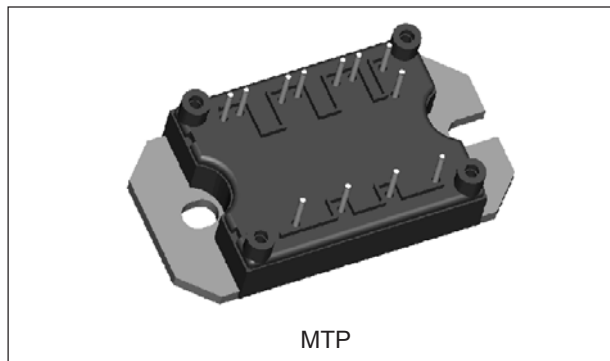
- NPT Warp2 Speed IGBT Technology with Positive Temperature Coefficient
- Hexfred Antiparallel Diodes with UltraSoft Reverse Recovery
- SMD Thermistor (NTC)
- Al₂O₃ DBC
- Very Low stray Inductance Design for high Speed Operation
- UL Pending
- TOTALLY LEAD-FREE



$V_{CES} = 600V$
 $V_{CE(on) typ.} = 2.1V @$
 $V_{GE} = 15V, I_C = 70A$
 $T_C = 25^\circ C$

Benefits

- Optimized for Welding, UPS and SMPS Applications
- Higher Switching Frequency up to 150kHz
- Lower Conduction Losses and Switching Losses
- Low EMI, requires Less Snubbing
- Direct Mounting to Heatsink
- PCB Solderable Terminals



Absolute Maximum Ratings

Parameters		Max	Units	
V_{CES}	Collector-to-Emitter Voltage	600	V	
I_C	Continuous Collector Current	@ $T_C = 25^\circ C$	100	
		@ $T_C = 78^\circ C$	70	
I_{CM}	Pulsed Collector Current	300	A	
I_{LM}	Peak Switching Current	300		
I_F	Diode Continuous Forward Current	@ $T_C = 78^\circ C$		53
I_{FM}	Peak Diode Forward Current			200
V_{GE}	Gate-to-Emitter Voltage	± 20		V
V_{ISOL}	RMS Isolation Voltage, Any Terminal to Case, t = 1 min	2500	W	
P_D	Maximum Power Dissipation, IGBT	@ $T_C = 25^\circ C$		347
		@ $T_C = 100^\circ C$	139	

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

Parameters	Min	Typ	Max	Units	Test Conditions
V _{(BR)CES} Collector-to-Emitter Breakdown Voltage	600			V	V _{GE} = 0V, I _C = 500μA
V _{CE(on)} Collector-to-Emitter Voltage		2.1	2.4		V _{GE} = 15V, I _C = 70A
		2.8	3.4		V _{GE} = 15V, I _C = 140A
		2.7	3		V _{GE} = 15V, I _C = 70A, T _J = 150°C
V _{GE(th)} Gate Threshold Voltage	3		6		I _C = 0.5mA
I _{CES} Collector-to-Emitter Leaking Current			0.7	mA	V _{GE} = 0V, V _{CE} = 600V
			10		V _{GE} = 0V, V _{CE} = 600V, T _J = 150°C
I _{GES} Gate-to-Emitter Leakage Current			± 250	nA	V _{GE} = ± 20V

Switching Characteristics @ T_J = 25°C (unless otherwise specified)

Parameters	Min	Typ	Max	Units	Test Conditions
Q _g Total Gate Charge (turn-on)		460	690	nC	I _C = 70A
Q _{ge} Gate-Emitter Charge (turn-on)		160	250		V _{CC} = 480V
Q _{gc} Gate-Collector Charge (turn-on)		70	130		V _{GE} = 15V
E _{on} Turn-On Switching Loss		1.1		mJ	R _G = 10 Ω
E _{off} Turn-Off Switching Loss		0.9			I _C = 70A, V _{CC} = 480V, V _{GE} = 15V, L = 200μH
E _{ts} Total Switching Loss		2			Energy losses include tail and diode reverse recovery
E _{on} Turn-On Switching Loss		1.27		mJ	R _G = 10 Ω
E _{off} Turn-Off Switching Loss		1.13			I _C = 70A, V _{CC} = 480V, V _{GE} = 15V, L = 200μH
E _{ts} Total Switching Loss		2.4			Energy losses include tail and diode reverse recovery, T _J = 150°C
td _{on} Turn-On Delay Time		314		ns	R _G = 10 Ω
t _r Rise Time		49			I _C = 70A, V _{CC} = 480V, V _{GE} = 15V, L = 200μH
td _{off} Turn-Off Delay Time		308			Energy losses include tail and diode reverse recovery
t _f Fall Time		68			
td _{on} Turn-On Delay Time		312		ns	R _G = 10 Ω
t _r Rise Time		50			I _C = 70A, V _{CC} = 480V, V _{GE} = 15V, L = 200μH
td _{off} Turn-Off Delay Time		320			Energy losses include tail and diode reverse recovery, T _J = 150°C
t _f Fall Time		78			
C _{ies} Input Capacitance		8000		pF	V _{GE} = 0V
C _{oes} Output Capacitance		790			V _{CC} = 30V
C _{res} Reverse Transfer Capacitance		110			f = 1.0 MHz
RBSOA Reverse Bias Safe Operating Area	full square				T _J = 150°C, I _C = 300A V _{CC} = 400V, V _P = 600V R _G = 22 Ω, V _{GE} = +15V to 0V

Thermistor Specifications

Parameters	Min	Typ	Max	Units	Test Conditions
R ₀ ⁽¹⁾ Resistance		30		kΩ	T ₀ = 25°C
β ⁽¹⁾⁽²⁾ Sensitivity index of the thermistor material		4000		K	T ₀ = 25°C T ₁ = 85°C

⁽¹⁾ T₀, T₁ are thermistor's temperatures

$$\frac{R_0}{R_1} = \exp \left[\beta \left(\frac{1}{T_0} - \frac{1}{T_1} \right) \right]$$

Diode Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameters		Min	Typ	Max	Units	Test Conditions
V_{FM}	Diode Forward Voltage Drop		1.64	2.1	V	$I_C = 70\text{A}, V_{GE} = 0\text{V}$
			2.1	2.4		$I_C = 140\text{A}, V_{GE} = 0\text{V}$
			1.69	1.9		$I_C = 70\text{A}, V_{GE} = 0\text{V}, T_J = 150^\circ\text{C}$
t_{rr}	Diode Reverse Recovery Time		96	126	ns	$V_{CC} = 200\text{V}, I_C = 70\text{A}$
I_{rr}	Diode Peak Reverse Current		9.4	12.8	A	$dI/dt = 200\text{A}/\mu\text{sec}$
Q_{rr}	Diode Recovery Charge		440	750	nC	
t_{rr}	Diode Reverse Recovery Time		140	194	ns	$V_{CC} = 200\text{V}, I_C = 70\text{A}$
I_{rr}	Diode Peak Reverse Current		14	19	A	$dI/dt = 200\text{A}/\mu\text{sec}$
Q_{rr}	Diode Recovery Charge		950	1700	nC	$T_J = 125^\circ\text{C}$

Thermal- Mechanical Specifications

Parameters		Min	Typ	Max	Units
T_J	Operating Junction Temperature Range	IGBT, Diode	- 40	150	$^\circ\text{C}$
		Thermistor	- 40	125	
T_{STG}	Storage Temperature Range		- 40	125	
R_{thJC}	Junction-to-Case	IGBT		0.36	$^\circ\text{C}/\text{W}$
		Diode		0.8	
R_{thCS}	Case-to-Sink (Heatsink Compound Thermal Conductivity = 1 W/mK)	Module	0.06		
T	Mounting torque to heatsink ⁽³⁾		$3 \pm 10\%$		Nm
Wt	Weight		66		g

⁽³⁾ A mounting compound is recommended and the torque should be checked after 3 hours to allow for the spread of the compound

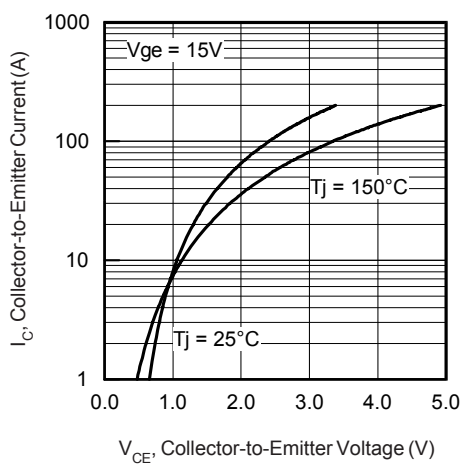


Fig. 1 - Typical Output Characteristics

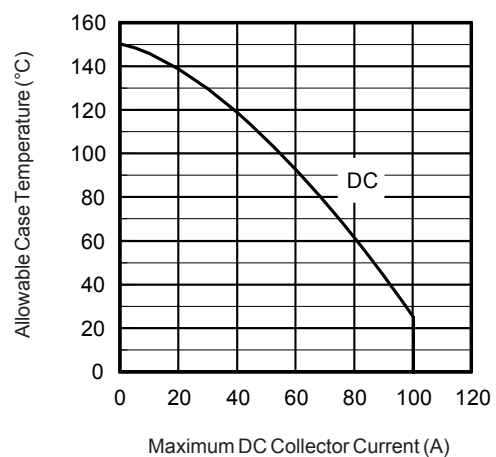


Fig. 2 - Maximum Collector Current vs. Case Temperature

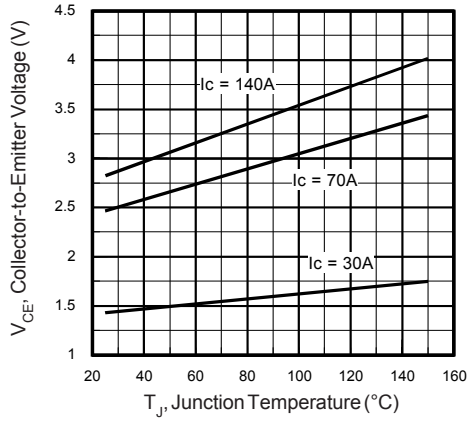


Fig. 3 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

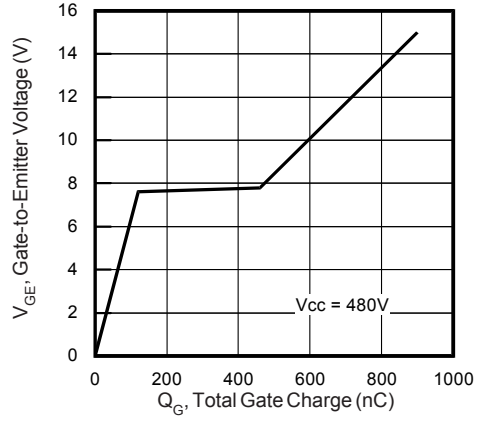


Fig. 4 - Typical Gate Charge vs. Gate-to-Emitter Voltage

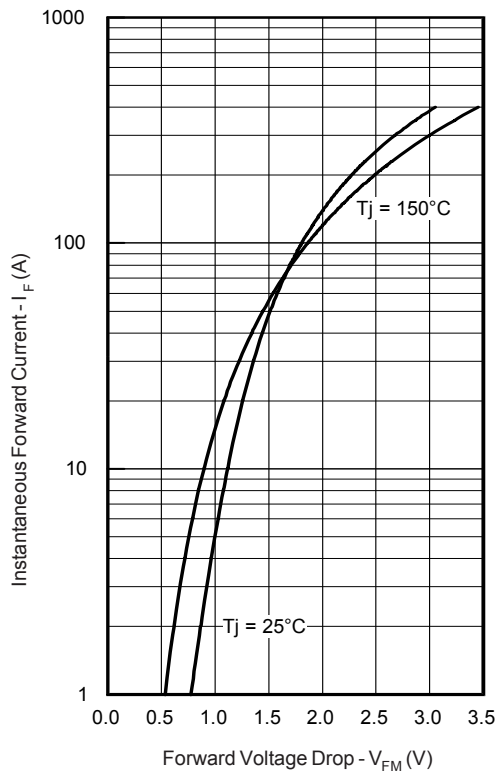


Fig. 5 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

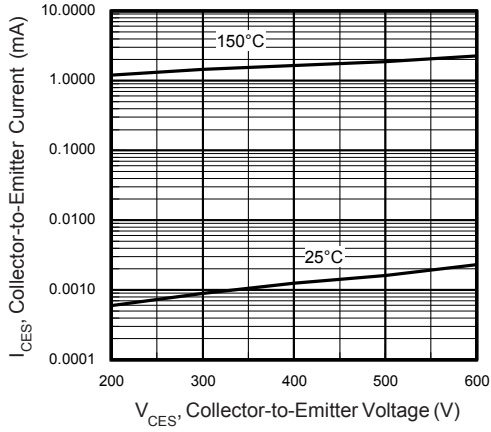


Fig. 6 - Typ. Zero Gate Voltage Collector Current

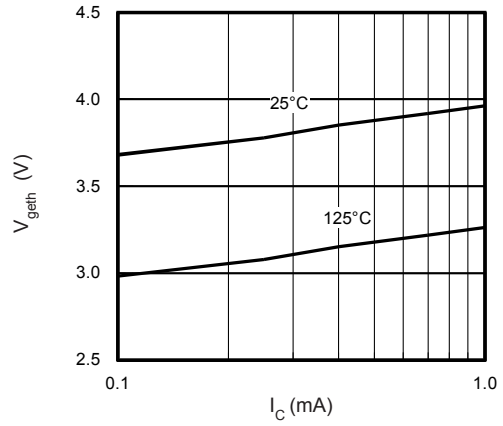


Fig. 7 - Typical Gate Threshold Voltage

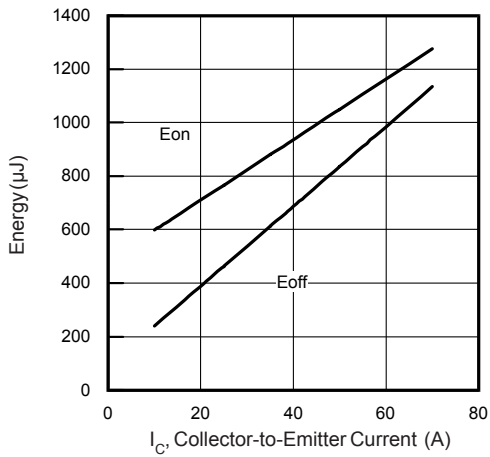


Fig. 8 - Typical Energy Losses vs. I_C ($T_J = 150^\circ\text{C}$)

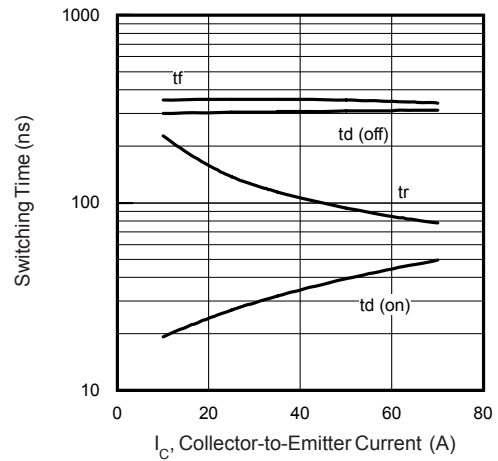


Fig. 9 - Switching Time Vs I_C

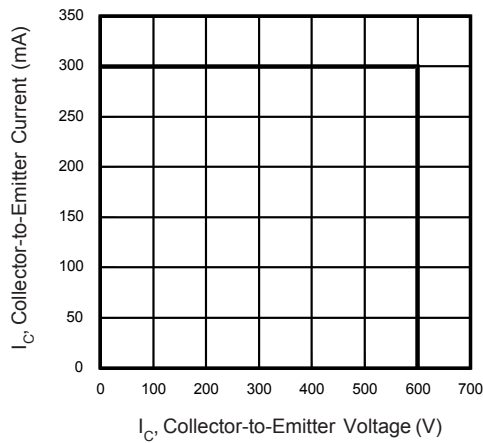


Fig. 10 - Reverse Bias SOA. $T_J = 150^\circ\text{C}$

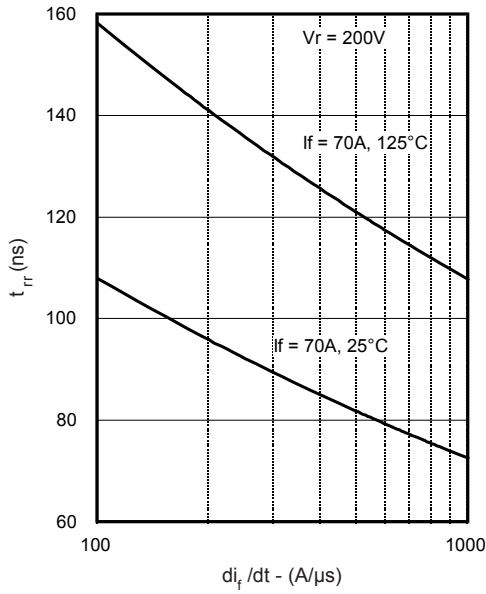


Fig. 11 - Typical Reverse Recovery vs. di_f/dt

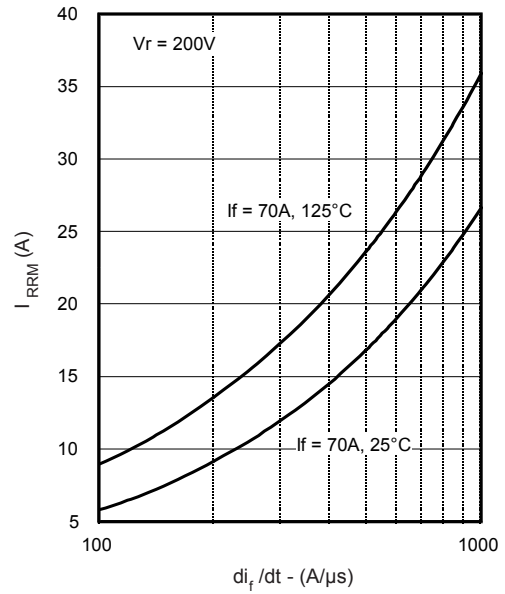


Fig. 12 - Typical Reverse Recovery Current vs. di_f/dt

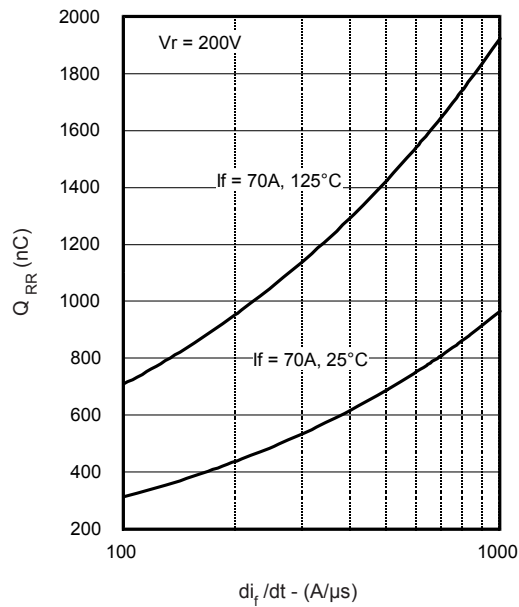


Fig. 13 - Typical Stored Charge vs. di_f/dt

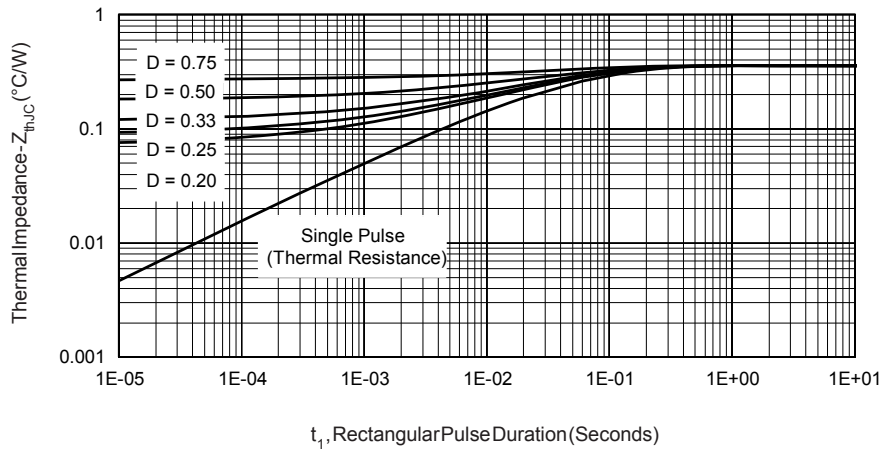


Fig.4 -Max. Thermal Impedance Z_{thJC} Characteristics (IGBT)

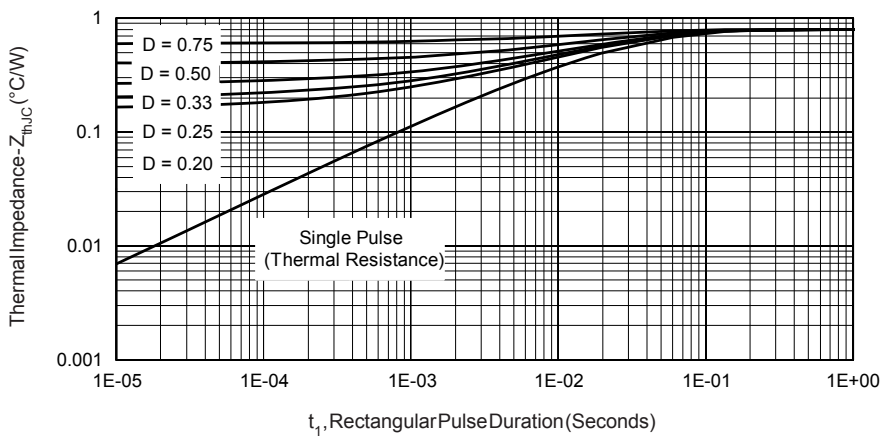
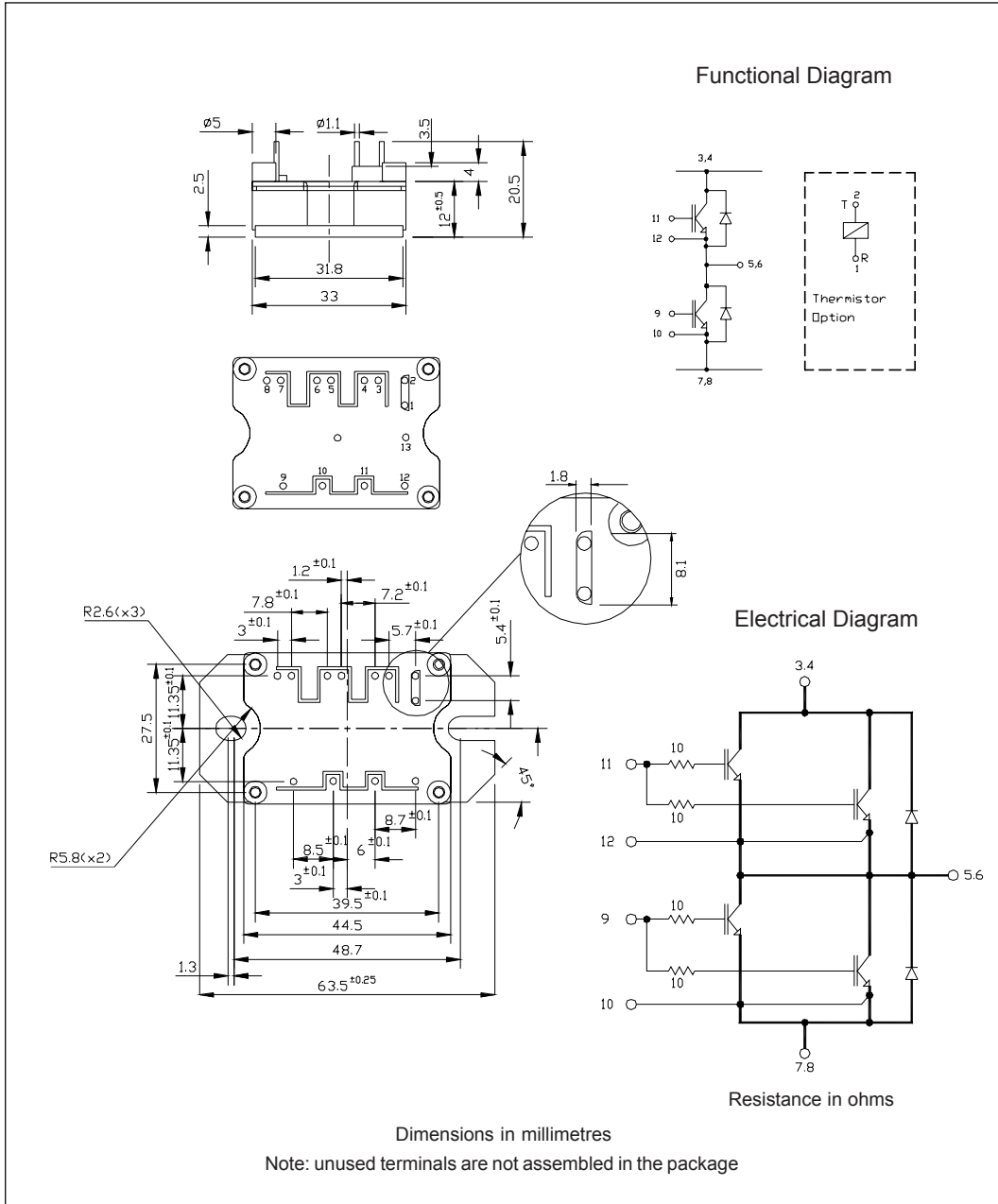


Fig.4 -Max. Thermal Impedance Z_{thJC} Characteristics (Diode)

Outline Table



Ordering Information Table

Device Code	70	MT	060	W	H	T	A	PbF
	①	②	③	④	⑤	⑥	⑦	⑧
	1	2	3	4	5	6	7	8
	-	-	-	-	-	-	-	-
	Current Rating (70 = 70A)	Essential Part Number	Voltage rating (060 = 600V)	Speed/ Type (W = Warp IGBT)	Circuit Configuration (H = Half Bridge)	T = Thermistor	A = Al ₂ O ₃ DBC Substrate	Lead-Free

Data and specifications subject to change without notice.
 This product has been designed and qualified for Industrial Level and Lead-Free.
 Qualification Standards can be found on IR's Web site.