Bulletin I27195 06/06

International
IOR Rectifier

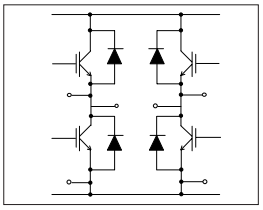
25MT060WFA

"FULL-BRIDGE" IGBT MTP

Warp Speed IGBT

Features

- Gen. 4 Warp Speed IGBT Technology
- HEXFRED ™ Antiparallel Diodes with UltraSoft Reverse Recovery
- Very Low Conduction and Switching Losses
- Optional SMT Thermistor
- Al_2O_3 DBC
- Very Low Stray Inductance Design for High Speed Operation

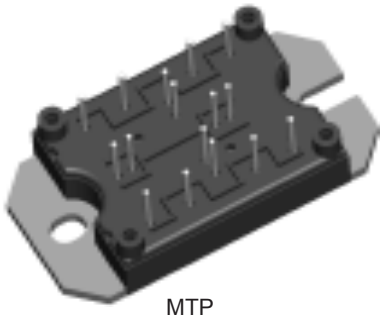


50 A

V_{CES} = 600V

Benefits

- Optimized for Welding, UPS and SMPS Applications
- Operating Frequencies > 20 kHz Hard Switching, >200 kHz Resonant Mode
- Low EMI, requires Less Snubbing
- Direct Mounting to Heatsink
- PCB Solderable Terminals
- Very Low Junction-to-Case Thermal Resistance
- UL pending



MTP

Absolute Maximum Ratings

	Parameters		Max	Units
V_{CES}	Collector-to-Emitter Voltage		600	V
I_C	Continuos Collector Current	@ T_C = 72°C	50	A
		@ T_C = 100°C	32	
I_{CM}	Pulsed Collector Current		200	
I_{LM}	Peak Switching Current		200	
I_F	Diode Continuous Forward Current	@ T_C = 100°C	25	
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	
P_D	Maximum Power Dissipation	@ T_C = 25°C	195	W
	per single IGBT	@ T_C = 100°C	78	

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 = 250µA
$\Delta V_{(BR)CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage		+0.6		V/°C	V_{GE} = 0V, I_C = 4mA (25-125°C)
$V_{CE(ON)}$	Collector-to-Emitter Saturation Voltage		2.22	3.14	V	V_{GE} = 15V, I_C = 25A
			2.43	3.25		V_{GE} = 15V, I_C = 50A
			1.65	1.93		V_{GE} = 15V, I_C = 25A T_J = 150°C
			2.08	2.45		V_{GE} = 15V, I_C = 50A T_J = 150°C
$V_{GE(th)}$	Gate Threshold Voltage	3		6		V_{CE} = V_{GE}, I_C = 250µA
$\Delta V_{GE(th)}/\Delta T_J$	Temperature Coeff. of Threshold Voltage		-17		mV/°C	V_{CE} = V_{GE}, I_C = 250µA (25-125°C)
g_{fe}	Transconductance		43		S	V_{CE} = 100V, I_C = 25A, PW = 80µs
I_{CES}	Zero Gate Voltage Collector Current (1)			250	µA	V_{GE} = 0V, V_{CE} = 600V, T_J = 25°C
				10	mA	V_{GE} = 0V, V_{CE} = 600V, T_J = 150°C
I_{GES}	Gate-to-Emitter Leakage Current			±250	nA	V_{GE} = ± 20V
V_{FM}	Diode Forward Voltage Drop		1.36	1.64	V	I_C = 25A
			1.57	1.93		I_C = 50A
			1.19	1.42		I_C = 25A, T_J = 150°C
			1.48	1.80		I_C = 50A, T_J = 150°C

(1) I_{CES} includes also opposite leg overall leakage

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

	Parameters	Min	Typ	Max	Units	Test Conditions
Q_g	Total Gate Charge (turn-on)		175	263	nC	I_C = 25A
Q_{ge}	Gate-Emitter Charge (turn-on)		27	41		V_{CC} = 480V
Q_{gc}	Gate-Collector Charge (turn-on)		71	107		V_{GE} = 15V
E_{on}	Turn-On Switching Loss		134	201	µJ	R_g= 5Ω , I_C = 25A
E_{off}	Turn-Off Switching Loss		415	623		V_{CC} = 480V
E_{ts}	Total Switching Loss		549	824		V_{GE} = ±15V
E_{on}	Turn-On Switching Loss		391	586	µJ	R_g= 5Ω , I_C = 25A
E_{off}	Turn-Off Switching Loss		492	738		V_{CC} = 480V
E_{ts}	Total Switching Loss		883	1324		V_{GE} = ±15V, T_J = 125°C
C_{ies}	Input Capacitance		3610	5415	pF	V_{GE} = 0V
C_{oes}	Output Capacitance		714	1071		V_{CC} = 30V
C_{res}	Reverse Transfer Capacitance		58	87		f = 1.0 MHz
trr	Diode Reverse Recovery Time		50		ns	V_R = 200V, I_C = 25A
Irr	Diode Peak Reverse Current		4.5		A	di/dt = 200A/µs
Qrr	Diode Recovery Charge		112		nC	
$di_{(rec)}M/dt$	Diode PeakRate of Fall of Recovery During t_b		250		A/µs	

Thermal- Mechanical Specifications

	Parameters		Min	Typ	Max	Units
T_J	Operating Junction Temperature Range		- 40		150	°C
T_{STG}	Storage Temperature Range		- 40		125	
R_{thJC}	Junction-to-Case	IGBT			0.64	°C/ W
		Diode			0.9	
R_{thCS}	Case-to-Sink (Heatsink Compound Thermal Conductivity = 1 W/mK)	Module		0.06		
	Clearance (2) (external shortest distance in air between two terminals)		5.5			mm
	Creepage (2) (shortest distance along external surface of the insulating material between 2 terminals)		8			
	Weight			66		g

(2) Standard version only i.e. without optional thermistor

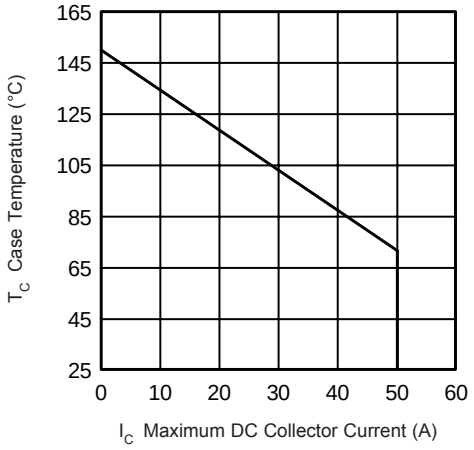


Fig. 4 - Maximum Collector Current vs. Case Temperature

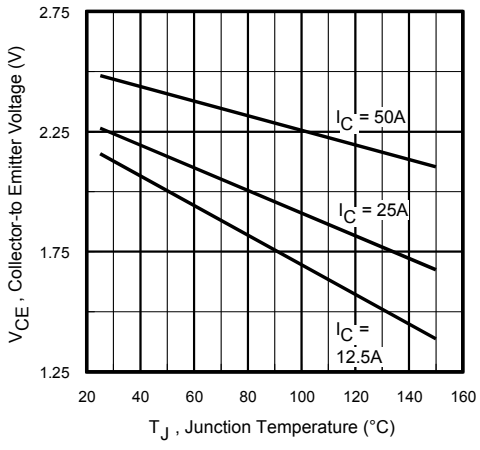


Fig. 5 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

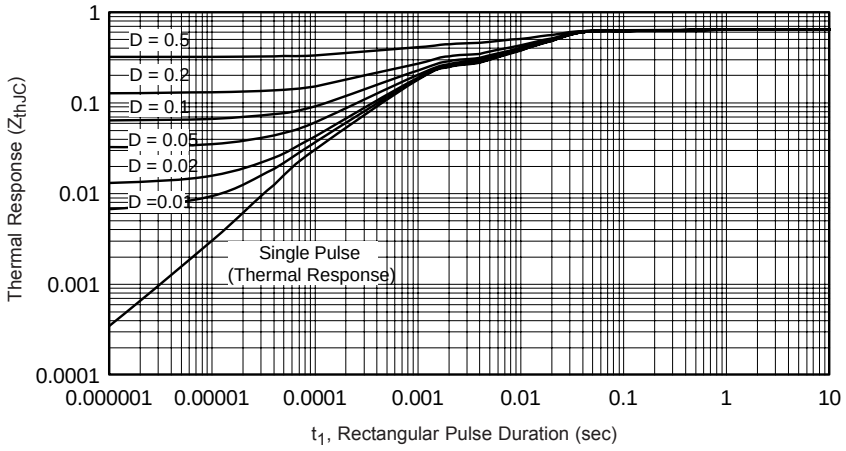


Fig. 6a Maximum Transient Thermal Impedance, Junction-to-Case (IGBT)

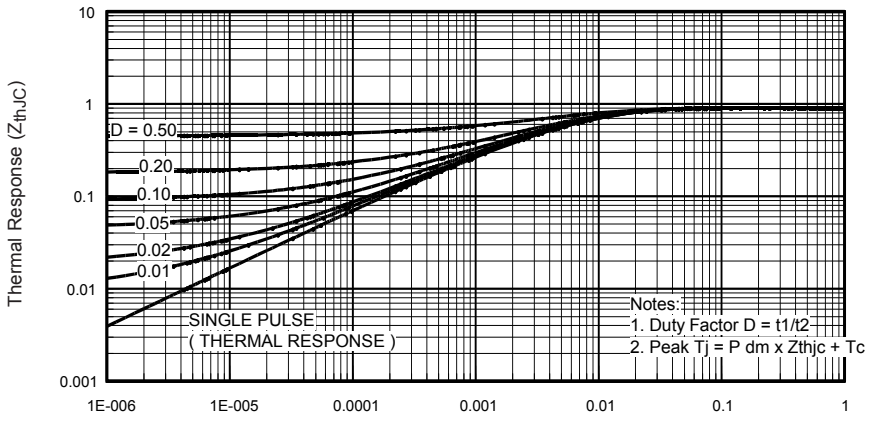


Fig. 6b Maximum Transient Thermal Impedance, Junction-to-Case (DIODE)

t_1, Thermal Response

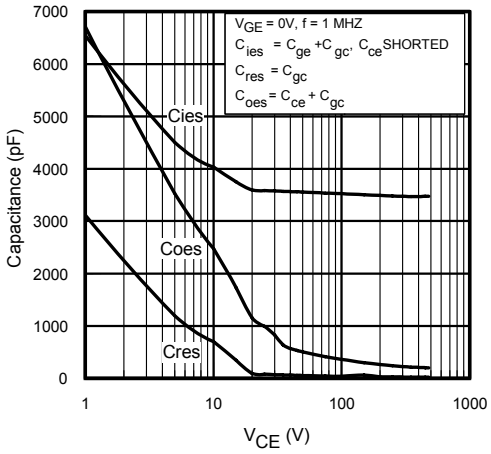


Fig. 7 - Typical Capacitance vs. Collector-to-Emitter Voltage

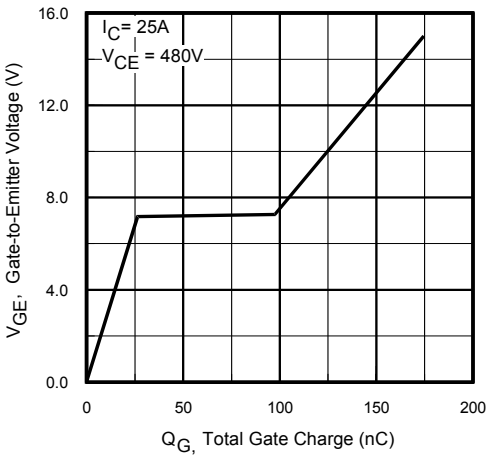


Fig. 8 - Typical Gate Charge vs. Gate-to-Emitter Voltage

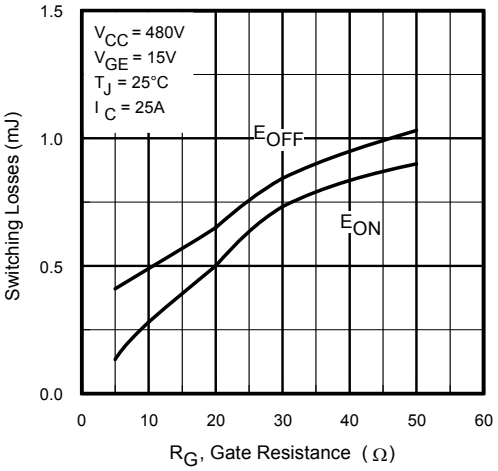


Fig. 9 - Typical Switching Losses vs. Gate Resistance

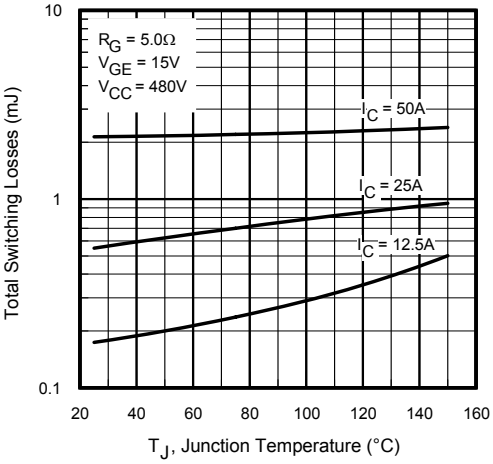


Fig. 10 - Typical Switching Losses vs. Junction Temperature

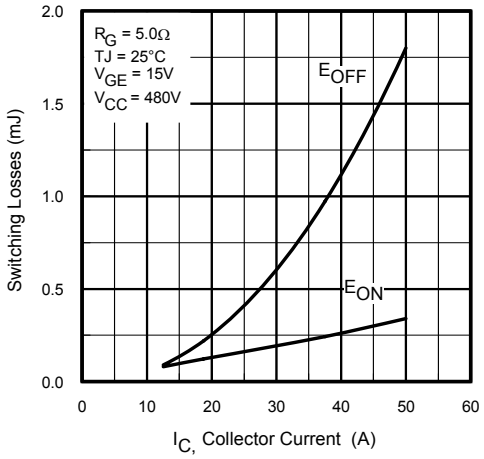


Fig. 11 - Typical Switching Losses vs. Collector-to-Emitter Current

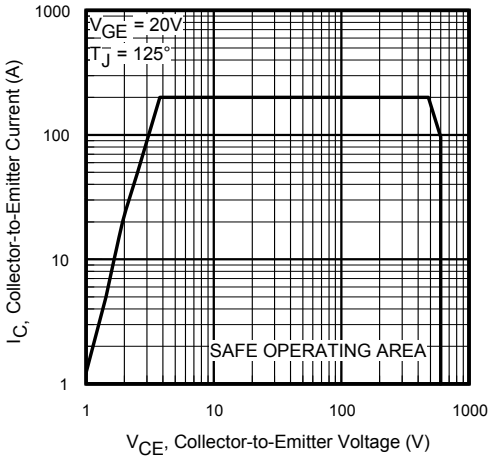


Fig. 12 - Turn-Off SOA

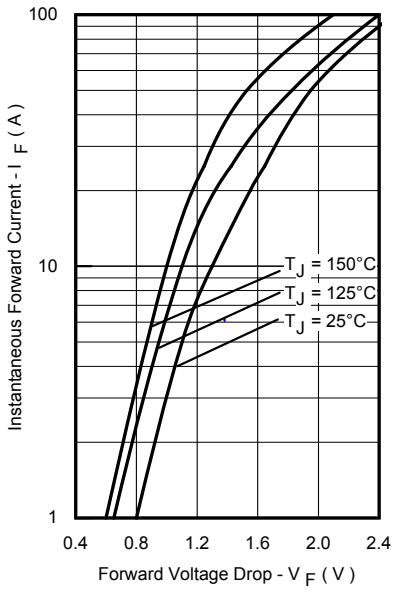


Fig. 13 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

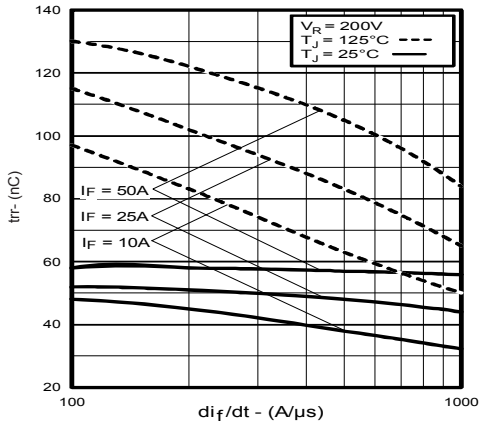


Fig. 14 - Typical Reverse Recovery vs. di_f/dt

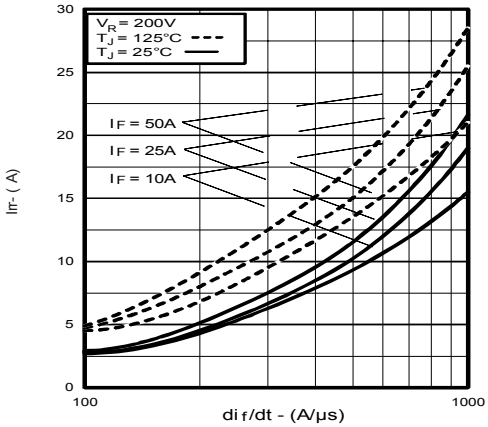


Fig. 15 - Typical Recovery Current vs. di_f/dt

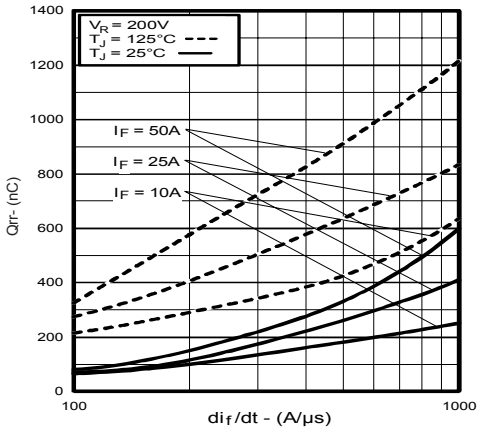


Fig. 16 - Typical Stored Charge vs. di_f/dt

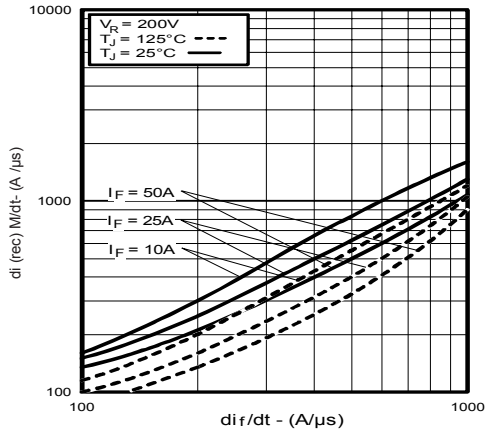
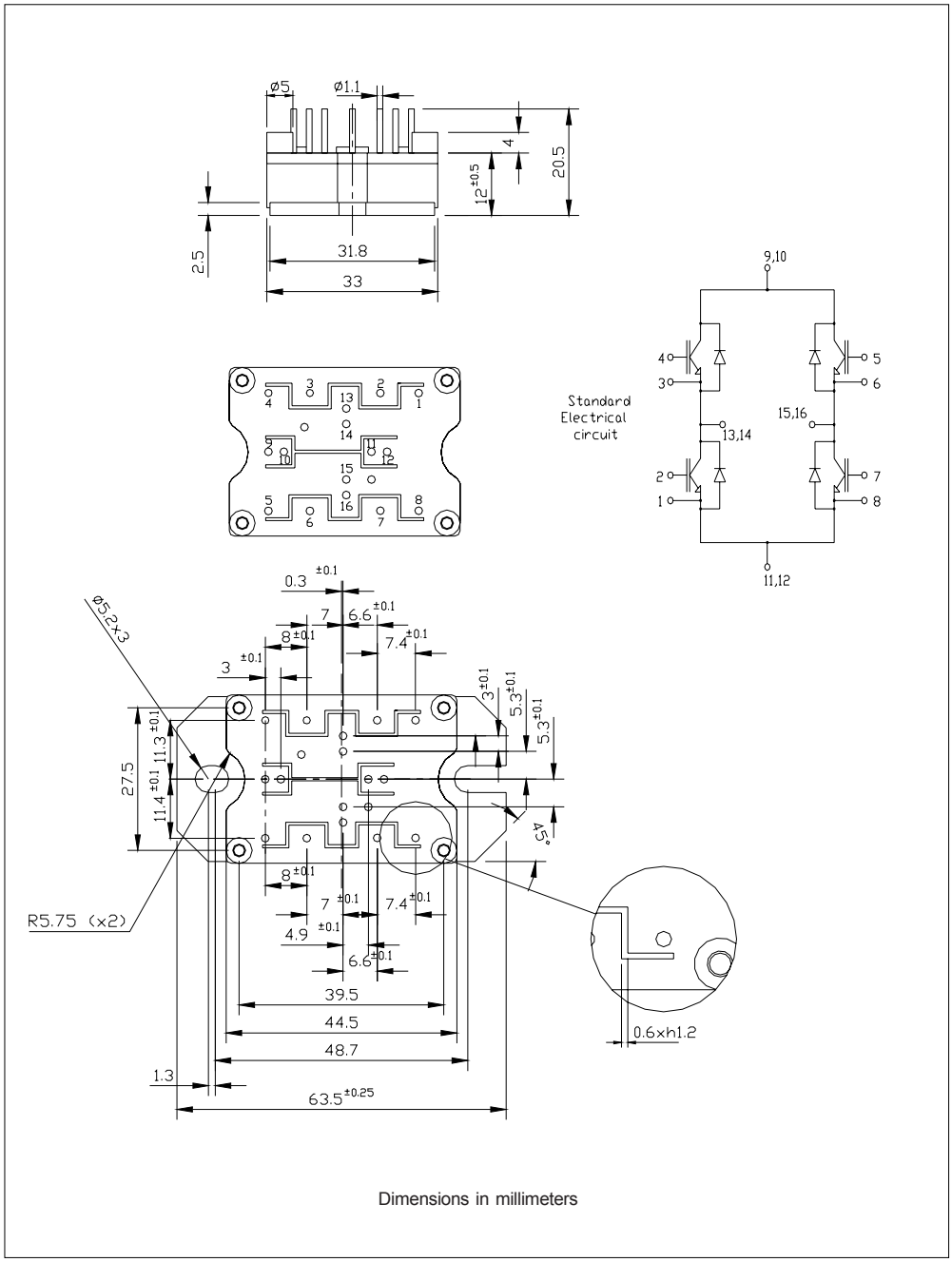


Fig. 17 - Typical $di_{(rec)M}/dt$ vs. di_f/dt

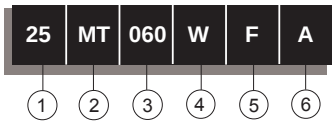
Outline Table



Dimensions in millimeters

Ordering Information Table

Device Code



1	-	Current rating	(25 = 25A)
2	-	Essential Part Number	
3	-	Voltage code	(060 = 600V)
4	-	Speed/ Type	(W = Warp® IGBT)
5	-	Circuit Configuration	(F = Full Bridge)
6	-	A = Al_2O_3 DBC Substrate	

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

International
IOR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7309
06/06

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