

International
IOR Rectifier

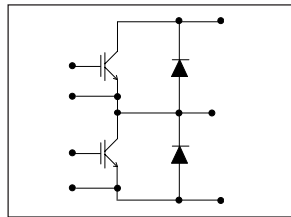
50MT060WHA
 50MT060WHTA

"HALF-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 SMD Thermistor (NTC)
- Al₂O₃ DBC
- Very Low Stray Inductance Design for High Speed Operation
- UL E78996 approved



$$V_{CES} = 600V$$

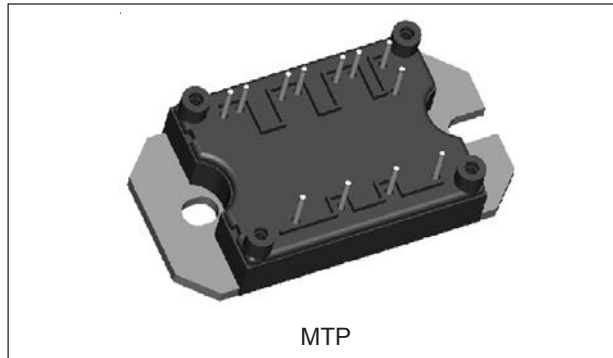
$$V_{CE(on) \text{ typ.}} = 2.3V @$$

$$V_{GE} = 15V, I_C = 50A$$

$$T_C = 25^\circ C$$

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



Absolute Maximum Ratings

Parameters		Max	Units	
V _{CES}	Collector-to-Emitter Voltage	600	V	
I _C	Continuous Collector Current	@ T _C = 25°C	114	
		@ T _C = 109°C	50	
I _{CM}	Pulsed Collector Current	350	A	
I _{LM}	Peak Switching Current	350		
I _F	Diode Continuous Forward Current	@ T _C = 109°C		34
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	658	
		@ T _C = 100°C	263	
			W	

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		2.3	3.15		V _{GE} = 15V, I _C = 50A
		2.5	3.2		V _{GE} = 15V, I _C = 100A
		1.72	2.17		V _{GE} = 15V, I _C = 50A, T _J = 150°C
V _{GE(th)} Gate Threshold Voltage	3		6		I _C = 0.5mA
I _{CES} Collector-to-Emitter Leaking Current			0.4	mA	V _{GE} = 0V, V _{CE} = 600V
			10		V _{GE} = 0V, V _{CE} = 600V, T _J = 150°C
V _{FM} Diode Forward Voltage Drop		1.58	1.80	V	I _F = 50A, V _{GE} = 0V
		1.49	1.68		I _F = 50A, V _{GE} = 0V, T _J = 150°C
		1.9	2.17		I _F = 100A, V _{GE} = 0V, T _J = 25°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)		331	385	nC	I _C = 52A
Q _{ge} Gate-Emitter Charge (turn-on)		44	52		V _{CC} = 400V
Q _{gc} Gate-Collector Charge (turn-on)		133	176		V _{GE} = 15V
E _{on} Turn-On Switching Loss		0.26		mJ	Internal gate resistors (see Electrical Diagram)
E _{off} Turn-Off Switching Loss		1.2			I _C = 50A, V _{CC} = 480V, V _{GE} = 15V, L = 200μH
E _{ts} Total Switching Loss		1.46			Energy losses include tail and diode reverse recovery
E _{on} Turn-On Switching Loss		0.73		mJ	Internal gate resistors (see Electrical diagram)
E _{off} Turn-Off Switching Loss		1.66			I _C = 50A, V _{CC} = 480V, V _{GE} = 15V, L = 200μH
E _{ts} Total Switching Loss		2.39			Energy losses include tail and diode reverse recovery, T _J = 150°C
C _{ies} Input Capacitance		7100		pF	V _{GE} = 0V
C _{oes} Output Capacitance		510			V _{CC} = 30V
C _{res} Reverse Transfer Capacitance		140			f = 1.0 MHz
t _{rr} Diode Reverse Recovery Time		82	97	ns	V _{CC} = 200V, I _C = 50A
I _{rr} Diode Peak Reverse Current		8.3	10.6	A	di/dt = 200A/μs
Q _{rr} Diode Recovery Charge		340	514	nC	
t _{rr} Diode Reverse Recovery Time		137	153	ns	V _{CC} = 200V, I _C = 50A
I _{rr} Diode Peak Reverse Current		12.7	14.8	A	di/dt = 200A/μs
Q _{rr} Diode Recovery Charge		870	1132	nC	T _J = 125°C

Thermistor Specifications (50MT060WHTA only)

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

$$^{(2)} \frac{R_0}{R_1} = \exp \left[\beta \left(\frac{1}{T_0} - \frac{1}{T_1} \right) \right]$$

Thermal- Mechanical Specifications

Parameters			Min	Typ	Max	Units
T _J	Operating Junction	IGBT, Diode	- 40		150	°C
	Temperature Range	Thermistor	- 40		125	
T _{STG}	Storage Temperature Range		- 40		125	
R _{thJC}	Junction-to-Case		IGBT		0.38	°C/ W
			Diode		0.8	
R _{thCS}	Case-to-Sink	Module		0.06		
(Heatsink Compound Thermal Conductivity = 1 W/mK)						
	Clearance ⁽³⁾ (external shortest distance in air between two terminals)		5.5			mm
	Creepage ⁽³⁾ (shortest distance along the external surface of the insulating material between 2 terminals)		8			
T	Mounting torque to heatsink ⁽⁴⁾		3 ± 10%			Nm
Wt	Weight		66			g

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

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

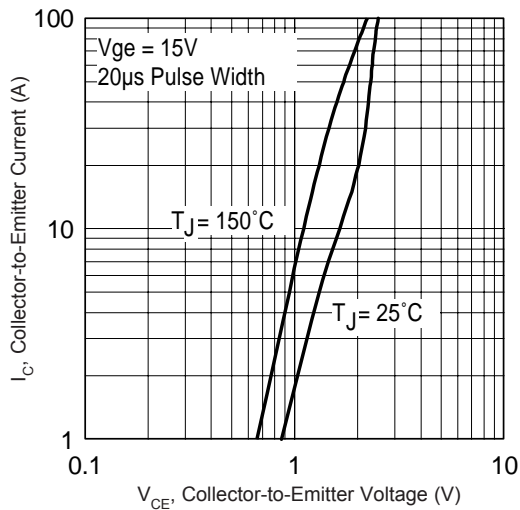


Fig. 1 - Typical Output Characteristics

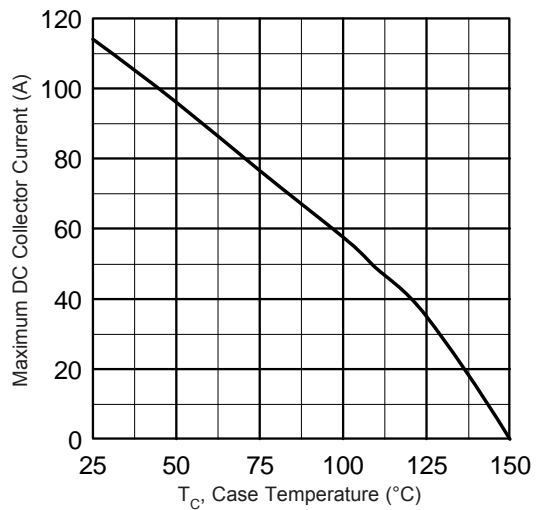


Fig. 2 - Maximum Collector Current vs. Case Temperature

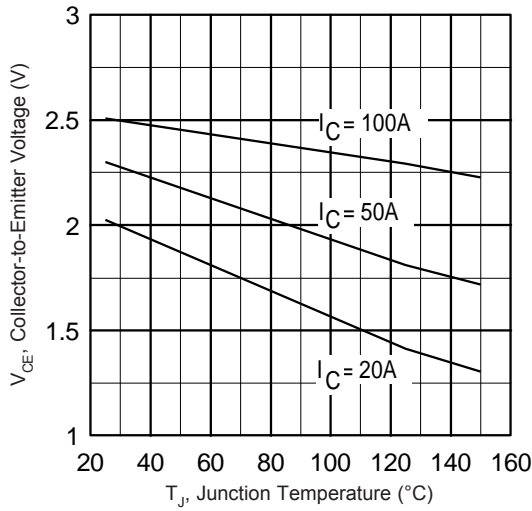


Fig. 3 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

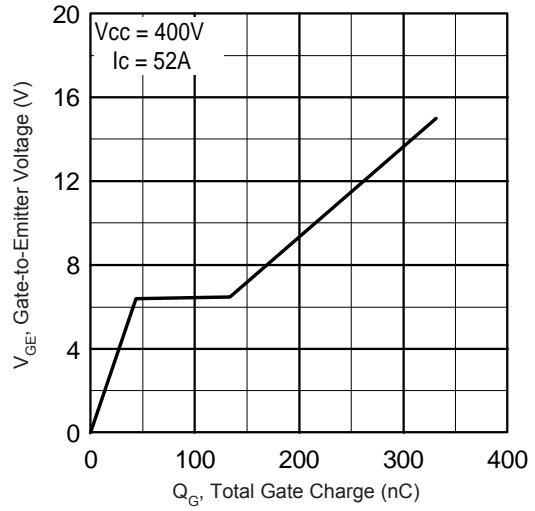


Fig. 4 - Typical Gate Charge vs. Gate-to-Emitter Voltage

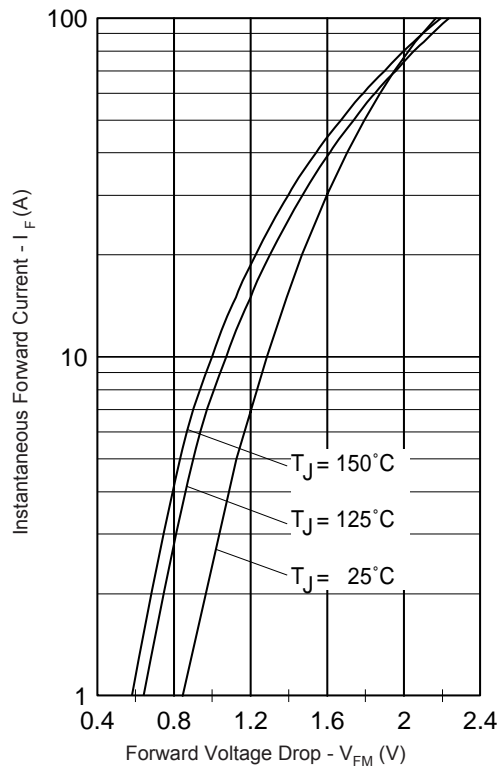


Fig. 5 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

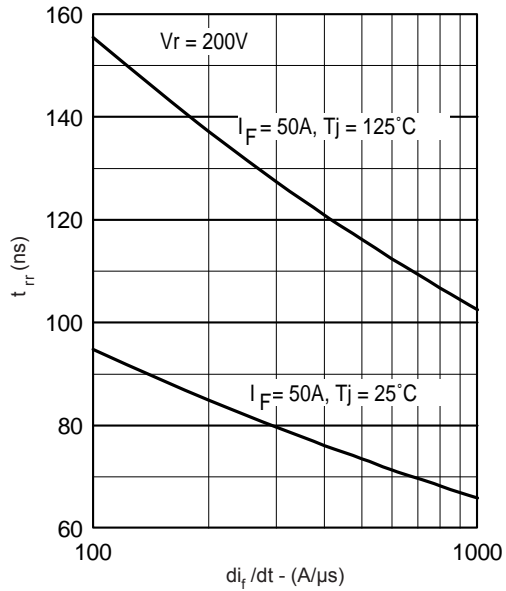


Fig. 6 - Typical Reverse Recovery vs. di_f/dt

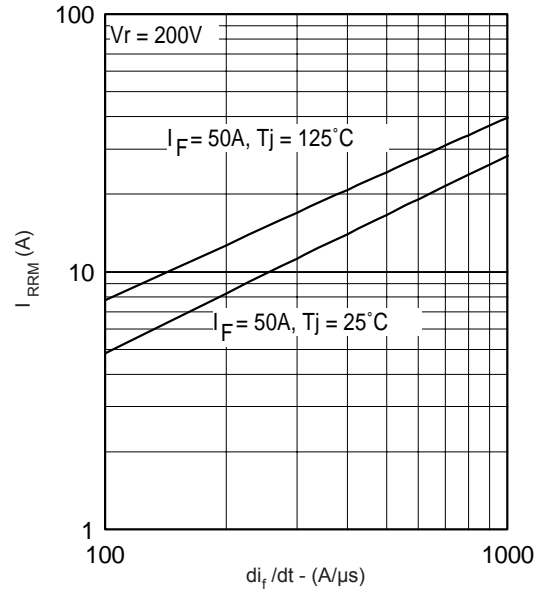


Fig. 7 - Typical Reverse Recovery Current vs. di_f/dt

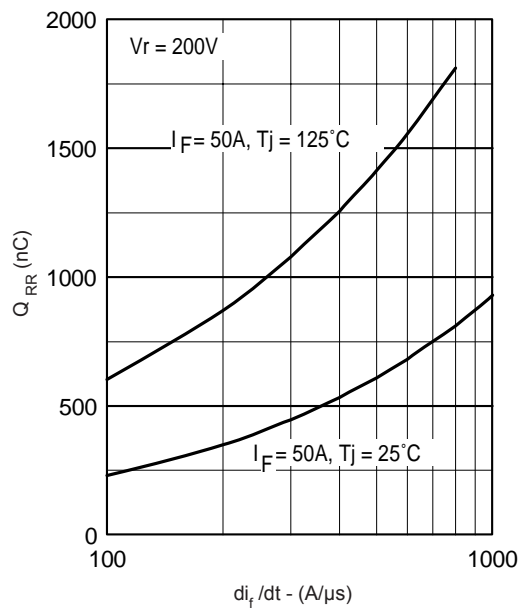
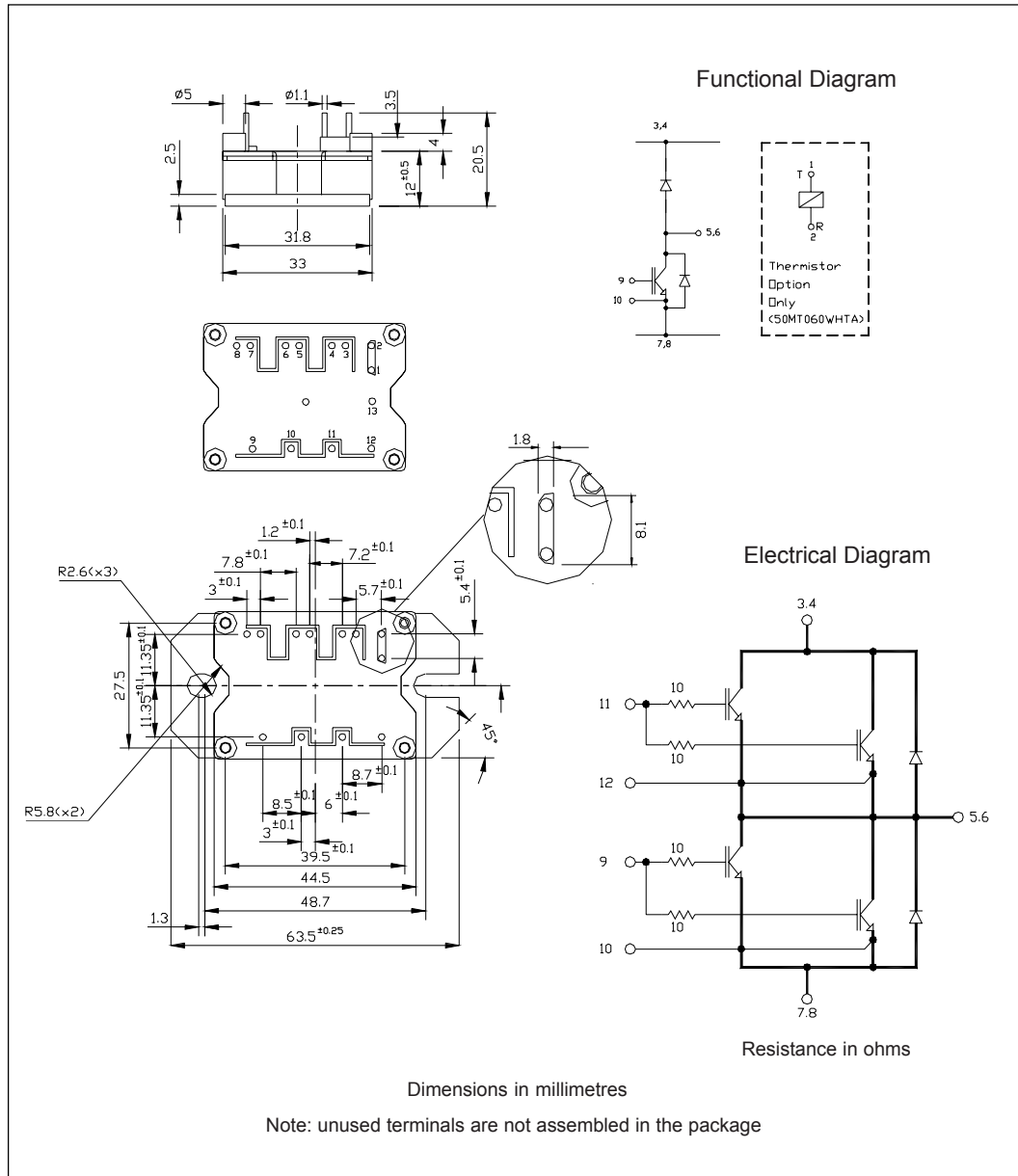


Fig. 8 - Typical Stored Charge vs. di_f/dt

Outline Table



Ordering Information Table

Device Code	50	MT	060	W	H	T	A
	1	2	3	4	5	6	7
1	-	Current Rating (50 = 50A)					
2	-	Essential Part Number					
3	-	Voltage rating (060 = 600V)					
4	-	Speed/ Type (W = Warp IGBT)					
5	-	Circuit Configuration (H = Half Bridge)					
6	-	Special Option					
		• none = no special option					
		• T = Thermistor					
7	-	A = Al ₂ O 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.



Notice

The products described herein were acquired by Vishay Intertechnology, Inc., as part of its acquisition of International Rectifier's Power Control Systems (PCS) business, which closed in April 2007. Specifications of the products displayed herein are pending review by Vishay and are subject to the terms and conditions shown below.

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.

International Rectifier®, IR®, the IR logo, HEXFET®, HEXSense®, HEXDIP®, DOL®, INTERO®, and POWIRTRAIN® are registered trademarks of International Rectifier Corporation in the U.S. and other countries. All other product names noted herein may be trademarks of their respective owners.