Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

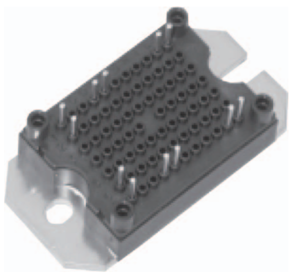
With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

MTP IGBT Power Module Primary Rectifier and PFC



MTP

PRODUCT SUMMARY	
INPUT BRIDGE DIODE, T_J = 150 °C	
V_{RRM}	1200 V
I_O at 80 °C	48 A
V_{FM} at 25 °C at 20 A	1.05 V
PFC IGBT, T_J = 150 °C	
V_{CES}	600 V
$V_{CE(on)}$ at 25 °C at 40 A	1.93 V
I_C at 80°C	66 A
FRED Pt® PFC DIODE, T_J = 150 °C	
V_R	600 V
$I_{F(DC)}$ at 80 °C	55 A
V_F at 25 °C at 40 A	1.76 V
FRED Pt® AP DIODE, T_J = 150 °C	
V_R	600 V
$I_{F(DC)}$ at 80 °C	13 A
V_F at 25 °C at 4 A	1.1 V
Speed	30 kHz to 150 kHz
Package	MTP
Circuit	Input rectifier bridge

FEATURES

- Input rectifier bridge
- PFC stage with warp 2 IGBT and FRED Pt® hyperfast diode
- Very low stray inductance design for high speed operation
- Integrated thermistor
- Isolated baseplate
- UL approved file E78996
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS
COMPLIANT

BENEFITS

- Lower conduction losses and switching losses
- Optimized for welding, UPS, and SMPS applications
- PCB solderable terminals
- Direct mounting to heatsink

ABSOLUTE MAXIMUM RATINGS

	PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Input Rectifier Bridge	Repetitive peak reverse voltage	V_{RRM}		1200	V
	Maximum average output current T_J = 150 °C maximum	I_O	T_C = 80 °C	48	A
	Surge current (Non-repetitive)	I_{FSM}	Rated V_{RRM} applied	250	
	Maximum I^2t for fusing	I^2t	10 ms, sine pulse	316	A^2s
PFC IGBT	Collector to emitter voltage	V_{CES}	T_J = 25 °C	600	V
	Gate to emitter voltage	V_{GE}	I_{GES} max. ± 250 ns	± 20	
	Maximum continuous collector current at V_{GE} = 15 V, T_J = 150 °C maximum	I_C	T_C = 25 °C	96	A
			T_C = 80 °C	66	
	Pulsed collector current	I_{CM} (1)		250	
	Clamped inductive load current	I_{LM}		250	
	Maximum power dissipation	P_D	T_C = 25 °C	378	W

ABSOLUTE MAXIMUM RATINGS					
	PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
PFC Diode	Repetitive peak reverse voltage	V_{RRM}		600	V
	Maximum continuous forward current T_J = 150 °C maximum	I_F	T_C = 25 °C	82	A
			T_C = 80 °C	55	
	Maximum power dissipation	P_D	T_C = 25 °C	181	W
	Maximum non-repetitive peak current	I_{FSM}	T_C = 25 °C	360	A
AP Diode	Repetitive peak reverse voltage	V_{RRM}		600	V
	Maximum continuous forward current T_J = 150 °C maximum	I_F	T_C = 25 °C	21	A
			T_C = 80 °C	13	
	Maximum power dissipation	P_D	T_C = 25 °C	32	W
	Maximum non-repetitive peak current	I_{FSM}	T_C = 25 °C	60	A
	Maximum operating junction temperature	T_J		150	°C
	Storage temperature range	T_{Stg}		-40 to +150	
	RMS isolation voltage	V_{ISOL}	V_{RMS} t = 1 s, T_J = 25 °C	3500	W

ΔR CONDUCTION PER JUNCTION - SINGLE PHASE BRIDGE DIODE											
DEVICES	SINE HALF WAVE CONDUCTION					RECTANGULAR WAVE CONDUCTION					UNITS
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
70MT060WSP	0.273	0.302	0.322	0.338	0.350	0.236	0.288	0.294	0.287	0.235	°C/W

ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise noted)							
	PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Rectifier Bridge	Blocking voltage	BV_{RRM}	I_R = 250 μA	1200	-	-	V
	Reverse leakage current	I_{RRM}	V_{RRM} = 1200 V	-	-	0.1	mA
			V_{RRM} = 1200 V, T_J = 150 °C	-	-	3.0	
	Forward voltage drop	V_{FM}	I_F = 20 A	-	1.05	1.2	V
			I_F = 20 A, T_J = 150 °C	-	0.94	1.0	
	Forward slope resistance	rt	T_J = 150 °C	-	-	8.7	mΩ
	Conduction threshold voltage	V_T		-	-	0.94	V
PFC IGBT	Collector to emitter breakdown voltage	BV_{CES}	V_{GE} = 0 V, I_C = 0.5 mA	600	-	-	V
	Temperature coefficient of breakdown voltage	$\Delta V_{BR(CES)}/\Delta T_J$	I_C = 0.5 mA (25 °C to 125 °C)	-	0.6	-	V/°C
	Collector to emitter voltage	$V_{CE(ON)}$	V_{GE} = 15 V, I_C = 40 A	-	1.93	2.15	V
			V_{GE} = 15 V, I_C = 40 A, T_J = 125 °C	-	2.30	2.55	
	Gate threshold voltage	$V_{GE(th)}$	V_{CE} = V_{GE}, I_C = 500 μA	2.9	-	5.6	V
	Collector to emitter leakage current	I_{CES}	V_{GE} = 0 V, V_{CE} = 600 V	-	-	0.1	mA
			V_{GE} = 0 V, V_{CE} = 600 V, T_J = 125 °C	-	-	1	
	Gate to emitter leakage	I_{GES}	V_{GE} = ± 20 V	-	-	± 100	nA
PFC Diode	Forward voltage drop	V_{FM}	I_F = 40 A	-	1.76	2.23	V
			I_F = 40 A, T_J = 125 °C	-	1.34	1.62	
	Blocking voltage	BV_{RM}	I_R = 0.5 mA	600	-	-	
	Reverse leakage current	I_{RM}	V_{RRM} = 600 V	-	-	75	μA
			V_{RRM} = 600 V, T_J = 125 °C	-	-	0.5	mA
AP Diode	Forward voltage drop	V_{FM}	I_F = 4 A	-	1.1	1.28	V
			I_F = 4 A, T_J = 125 °C	-	0.95	1.09	

ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise noted)							
	PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
RECOVERY PARAMETER							
PFC Diode	Peak reverse recovery current	I_{rr}	I_F = 40 A dI/dt = 200 A/μs V_R = 200 V	-	4	7	A
	Reverse recovery time	t_{rr}		-	59	79	ns
	Reverse recovery charge	Q_{rr}		-	118	180	nC
	Peak reverse recovery current	I_{rr}	I_F = 40 A, T_J = 125 °C dI/dt = 200 A/μs V_R = 200 V	-	12	17	A
	Reverse recovery time	t_{rr}		-	127	170	ns
	Reverse recovery charge	Q_{rr}		-	733	1200	nC
AP Diode	Peak reverse recovery current	I_{rr}	I_F = 4 A dI/dt = 200 A/μs V_R = 200 V	-	7	10	A
	Reverse recovery time	t_{rr}		-	78	120	ns
	Reverse recovery charge	Q_{rr}		-	290	600	nC

SWITCHING CHARACTERISTICS (T_J = 25 °C unless otherwise noted)							
	PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
PFC IGBT	Total gate charge	Q_g	I_C = 50 A V_{CC} = 400 V V_{GE} = 15 V	-	320	-	nC
	Gate to source charge	Q_{gs}		-	42	-	
	Gate to drain (Miller) charge	Q_{gd}		-	110	-	
	Turn-on switching loss	E_{on}	I_C = 70 A, V_{CC} = 360 V, V_{GE} = 15 V R_g = 5 Ω, L = 500 μH, T_J = 25 °C	-	0.13	-	mJ
	Turn-off switching loss	E_{off}		-	0.18	-	
	Total switching loss	E_{tot}		-	0.31	-	
	Turn-on delay time	$t_{d(on)}$		-	193	-	ns
	Rise time	t_r		-	35	-	
	Turn-off delay time	$t_{d(off)}$		-	202	-	
	Fall time	t_f		-	49	-	
	Turn-on switching loss	E_{on}	I_C = 70 A, V_{CC} = 360 V, V_{GE} = 15 V R_g = 5 Ω, L = 500 μH, T_J = 125 °C	-	0.25	-	mJ
	Turn-off switching loss	E_{off}		-	0.32	-	
	Total switching loss	E_{tot}		-	0.57	-	
	Turn-on delay time	$t_{d(on)}$		-	193	-	ns
	Rise time	t_r		-	35	-	
	Turn-off delay time	$t_{d(off)}$		-	208	-	
	Fall time	t_f		-	66	-	
	Input capacitance	C_{ies}	V_{GE} = 0 V V_{CC} = 30 V f = 1 MHz	-	7430	-	pF
	Output capacitance	C_{oes}		-	530	-	
	Reverse transfer capacitance	C_{res}		-	94	-	
	Reverse bias safe operating area	RBSOA	I_C = 250 A, V_{CC} = 400 V, V_P = 600 V, R_g = 22 Ω, V_{GE} = 15 V, L = 500 μH, T_J = 150 °C	Full square			

THERMISTOR ELECTRICAL CHARACTERISTICS (T_J = 25 °C unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Resistance	R	T_J = 25 °C	-	30 000	-	Ω
B value	B	T_J = 25 °C/T_J = 85 °C	-	4000	-	K

Notes

- Repetitive rating; pulsed with limited by maximum junction temperature.

THERMAL AND MECHANICAL SPECIFICATIONS						
	PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Input Rectifier Bridge	Junction to case diode thermal resistance	R_{thJC}	-	-	0.9	°C/W
PFC IGBT	Junction to case IGBT thermal resistance		-	-	0.33	
PFC Diode	Junction to case PFC diode thermal resistance		-	-	0.69	
AP Diode	Junction to case AP diode thermal resistance		-	-	3.92	
	Case to sink, flat, greased surface per module	R_{thCS}	-	0.06	-	°C/W
	Mounting torque ± 10 % to heatsink (1)		-	-	4	Nm
	Approximate weight		-	65	-	g

Notes

- A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow for the spread of the compound. Lubricated threads.

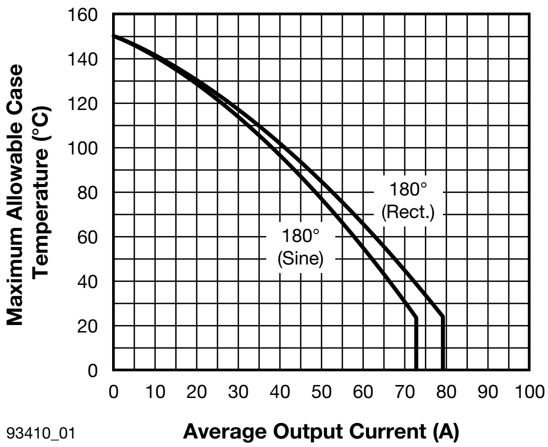


Fig. 1 - Single Phase Input Bridge Output Current Ratings Characteristics

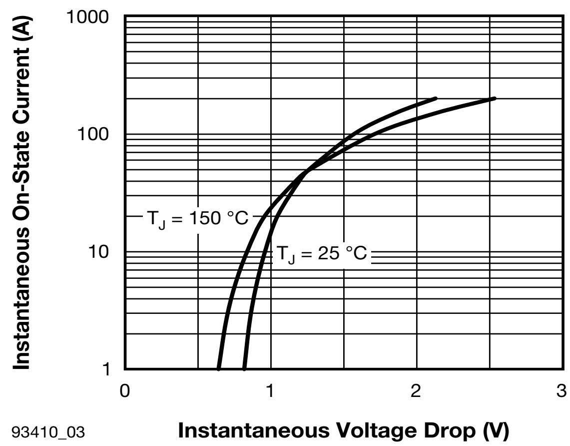


Fig. 3 - Single Phase Input Bridge On-State Voltage Drop Characteristics

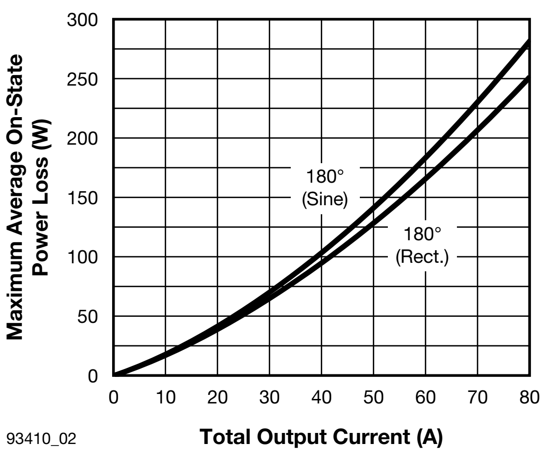


Fig. 2 - Single Phase Bridge On-State Power Loss Characteristics

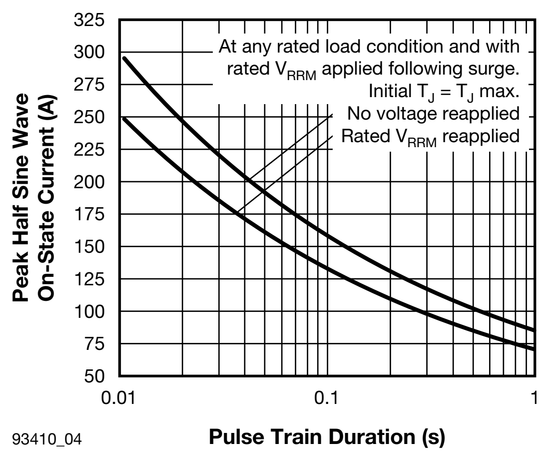


Fig. 4 - Single Phase Input Bridge Maximum Non-Repetitive Surge Current (Per Junction)

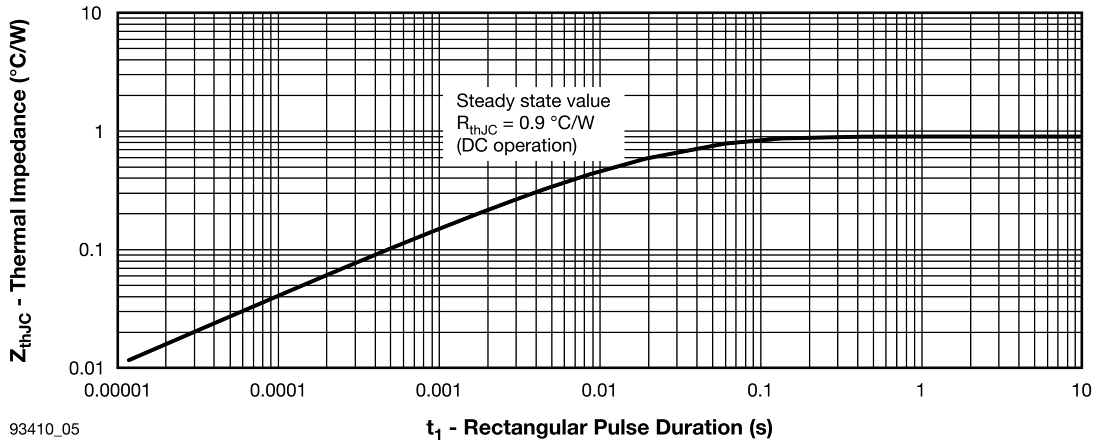


Fig. 5 - Maximum Input Bridge Thermal Impedance Z_{thJC} Characteristics (Per Junction)

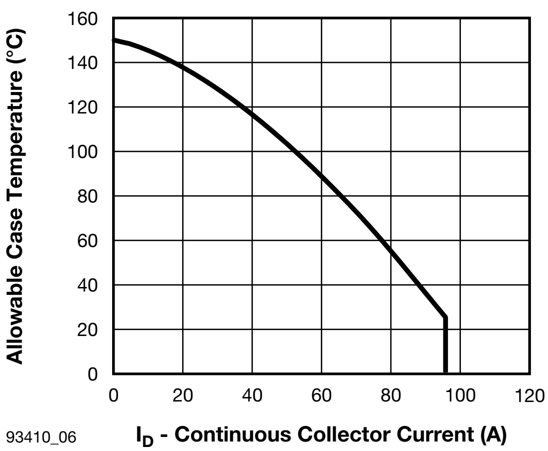


Fig. 6 - Maximum IGBT Continuous Collector Current vs. Case Temperature

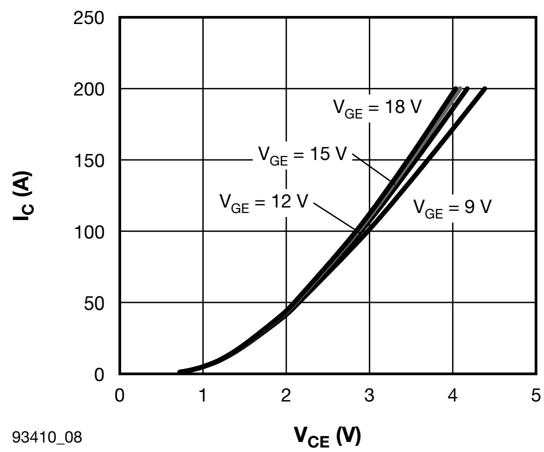


Fig. 8 - Typical IGBT Output Characteristics, T_J = 25 °C

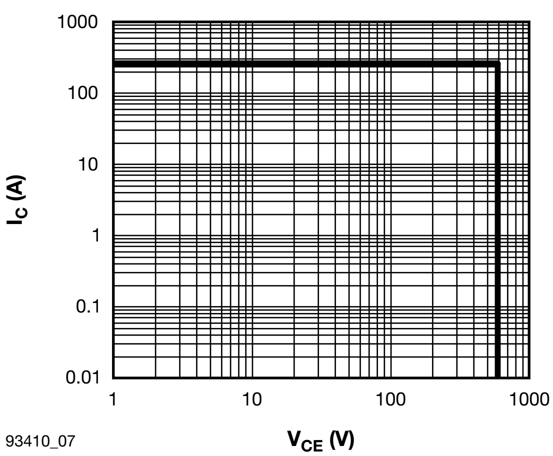


Fig. 7 - IGBT Reverse BIAS SOA T_J = 150 °C, V_{GE} = 15 V

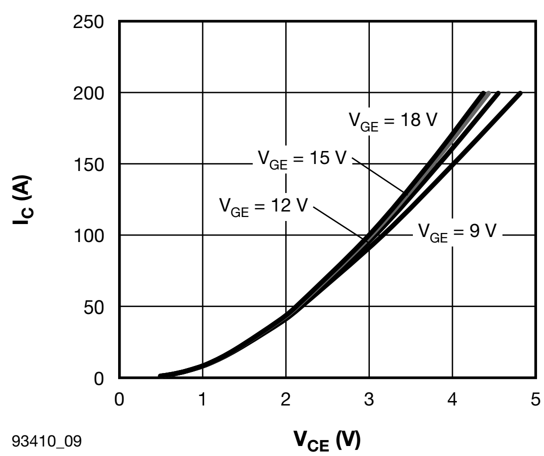


Fig. 9 - Typical IGBT Output Characteristics, T_J = 125 °C

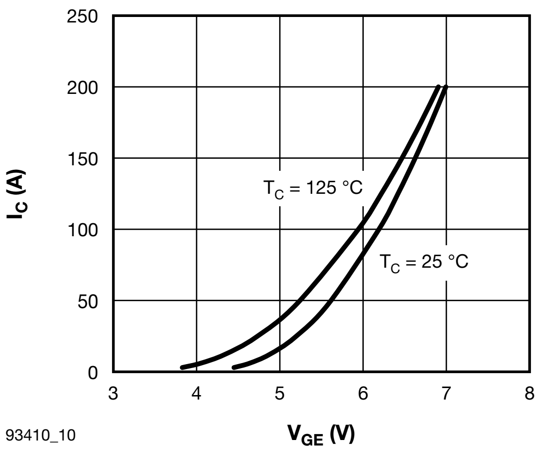


Fig. 10 - Typical IGBT Transfer Characteristics, T_J = 125 °C

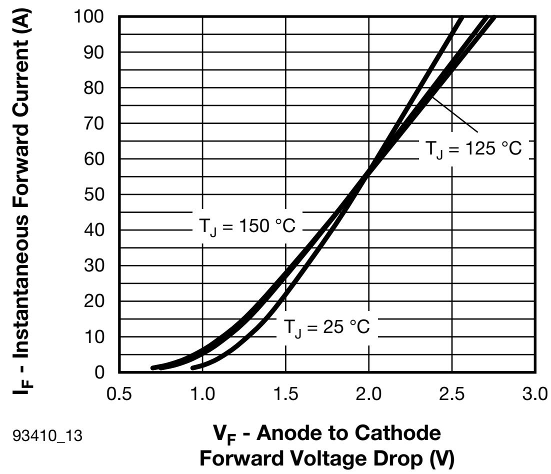


Fig. 13 - Typical Diode Forward Voltage Characteristics of Antiparallel Diode, t_p = 500 μs

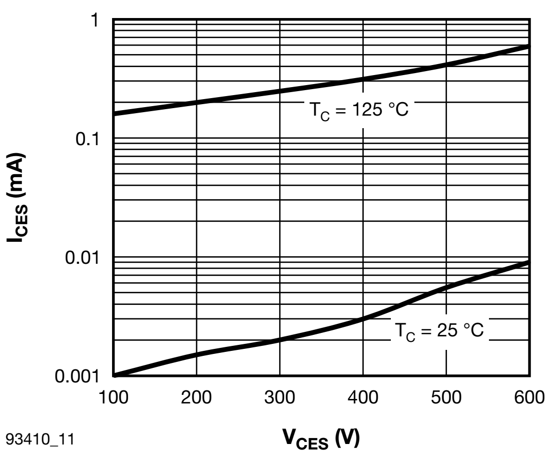


Fig. 11 - Typical IGBT Zero Gate Voltage Collector Current

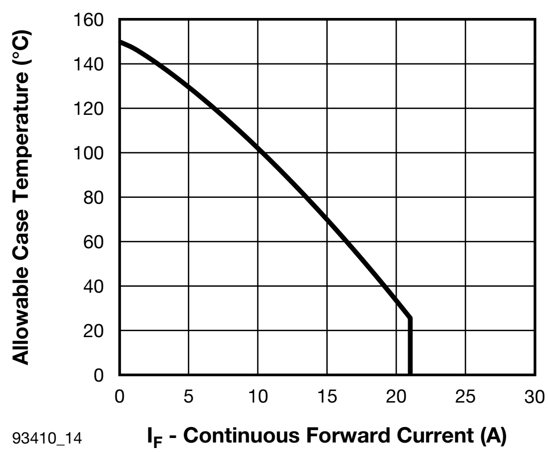


Fig. 14 - Maximum Continuous Forward Current vs. Case Temperature Antiparallel Diode

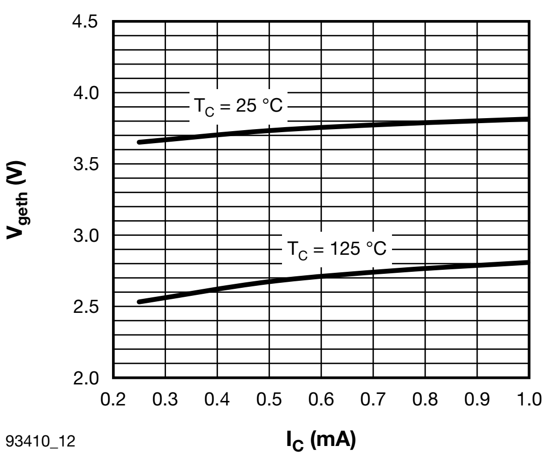


Fig. 12 - Typical IGBT Gate Thresold Voltage

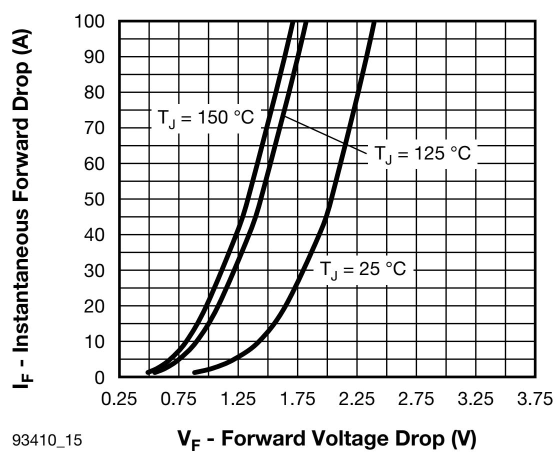


Fig. 15 - Typical PFC Diode Forward Voltage

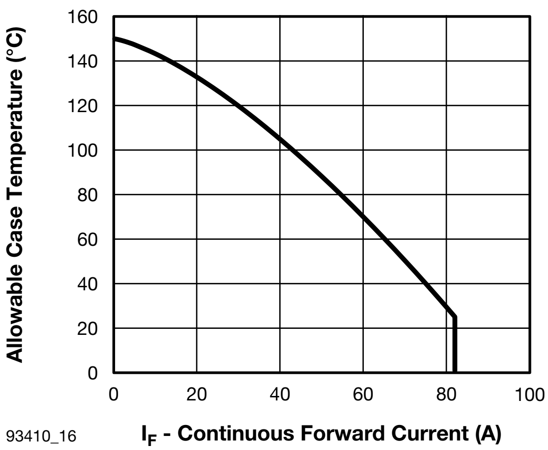


Fig. 16 - Maximum Continuous Forward Current vs. Case Temperature PFC Diode

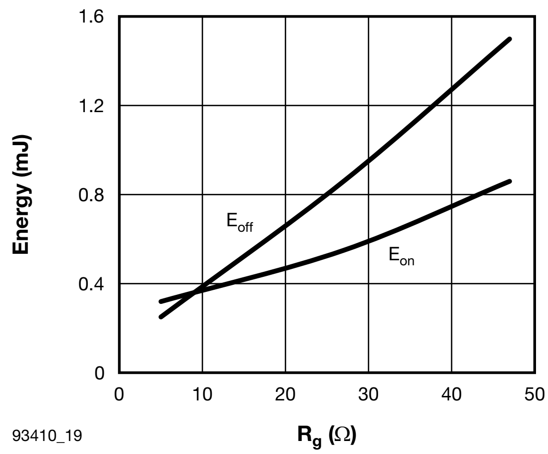


Fig. 19 - Typical IGBT Energy Loss vs. R_g
T_J = 125 °C, I_C = 70 A, V_{CC} = 360 V, V_{GE} = 15 V, L = 500 μH, R_g = 5 Ω

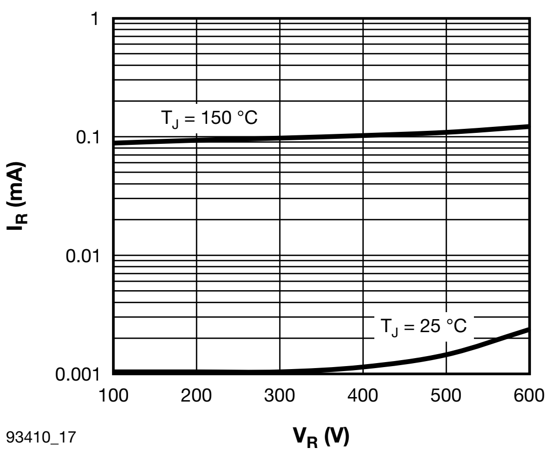


Fig. 17 - Typical FRED Pt® Chopper Diode Reverse Current vs. Reverse Voltage

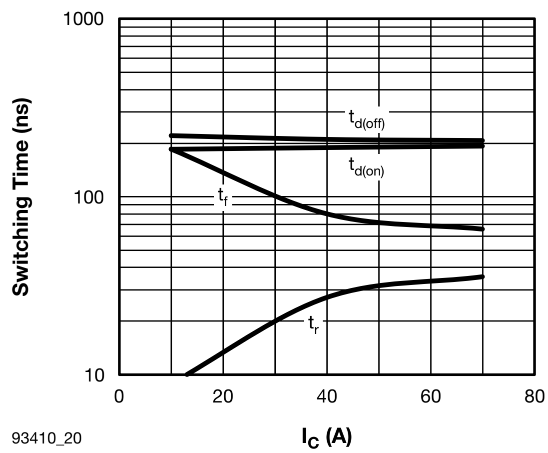


Fig. 20 - Typical IGBT Switching Time vs. I_C
T_J = 125 °C, V_{CC} = 360 V, V_{GE} = 15 V, L = 500 μH, R_g = 5 Ω

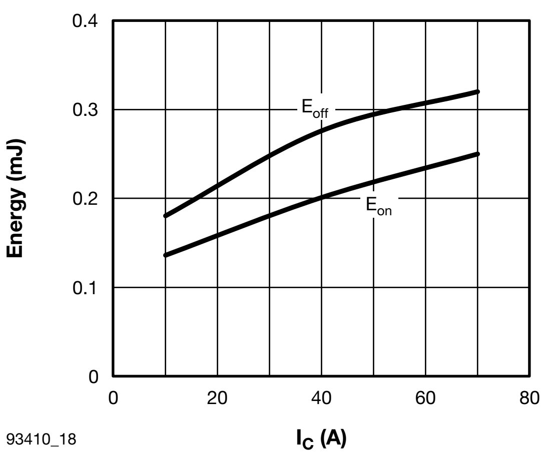


Fig. 18 - Typical IGBT Energy Loss vs. I_C
T_J = 125 °C, V_{CC} = 360 V, V_{GE} = 15 V, L = 500 μH, R_g = 5 Ω

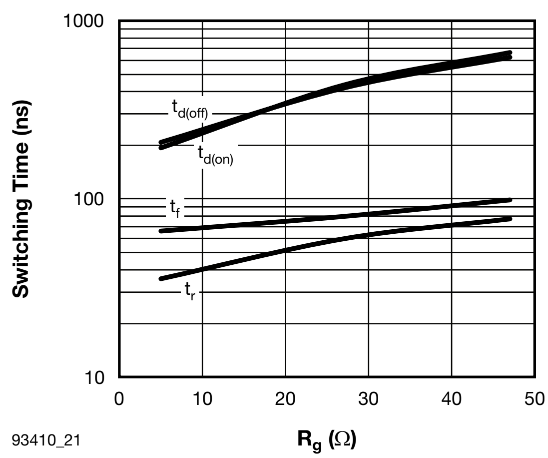


Fig. 21 - Typical IGBT Switching Time vs. R_g
T_J = 125 °C, I_C = 70 A, V_{CE} = 360 V, V_{GE} = 15 V, L = 500 μH

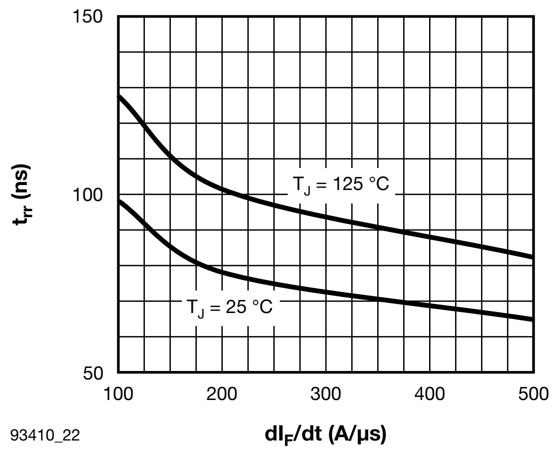


Fig. 22 - Typical t_{rr} Antiparallel Diode vs. dI_F/dt
V_{rr} = 200 V, I_F = 4 A

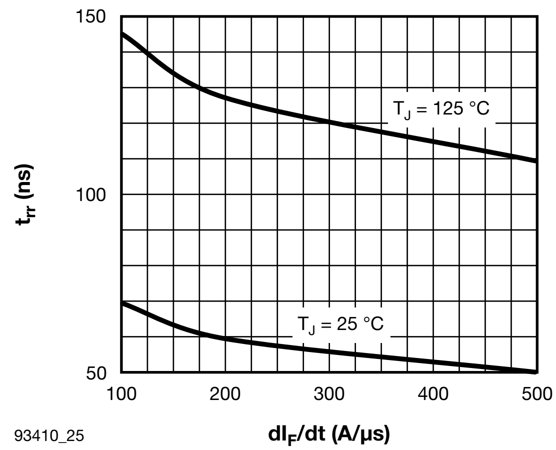


Fig. 25 - Typical t_{rr} Chopper Diode vs. dI_F/dt, V_{rr} = 200 V, I_F = 40 A

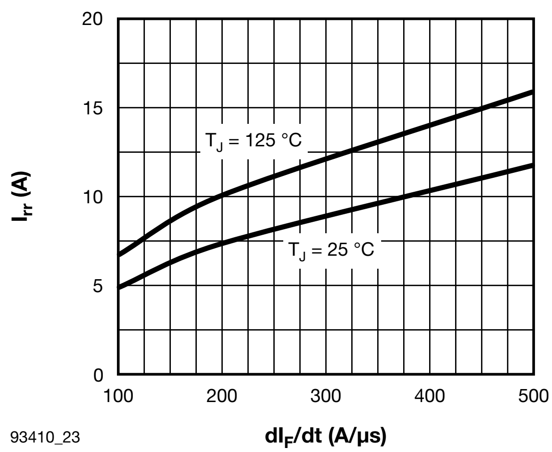


Fig. 23 - Typical I_{rr} Antiparallel Diode vs. dI_F/dt
V_{rr} = 200 V, I_F = 4 A

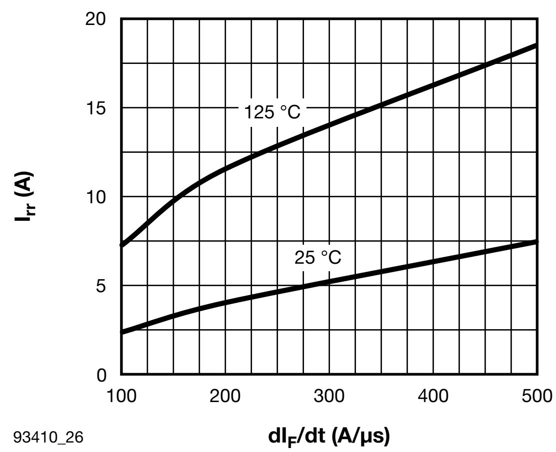


Fig. 26 - Typical I_{rr} Chopper Diode vs. dI_F/dt
V_{rr} = 200 V, I_F = 40 A

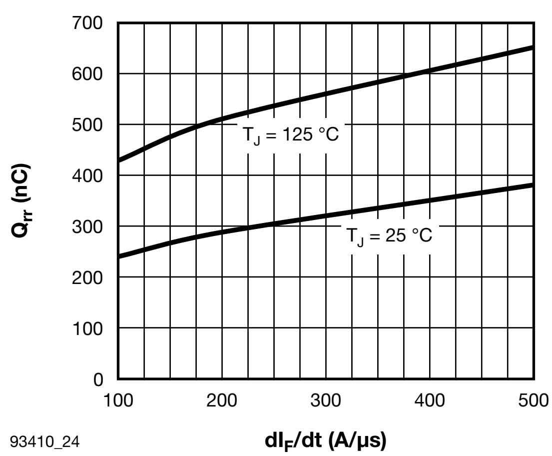


Fig. 24 - Typical Q_{rr} Antiparallel Diode vs. dI_F/dt
V_{rr} = 200 V, I_F = 4 A

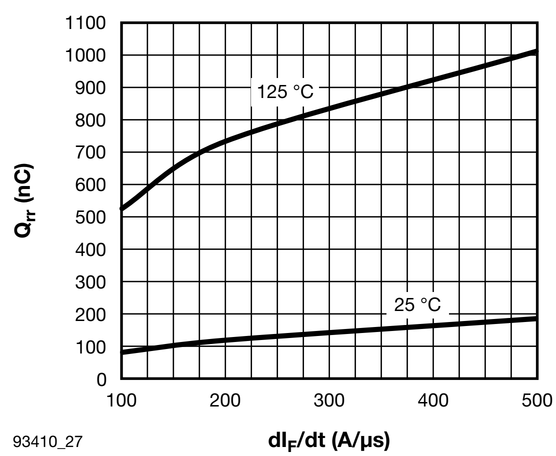


Fig. 27 - Typical Q_{rr} Chopper Diode vs. dI_F/dt, V_{rr} = 200 V, I_F = 40 A

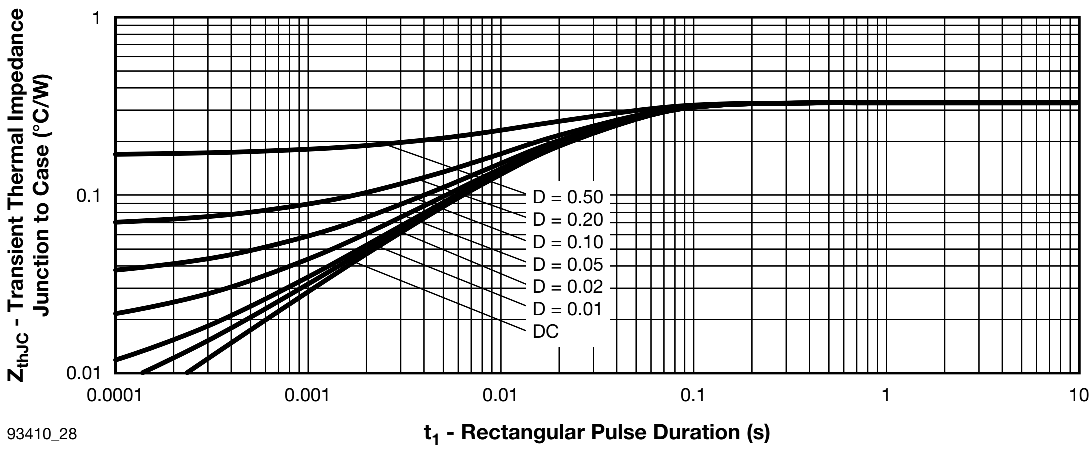


Fig. 28 - Maximum Thermal Impedance Z_{thJC} Characteristics (IGBT)

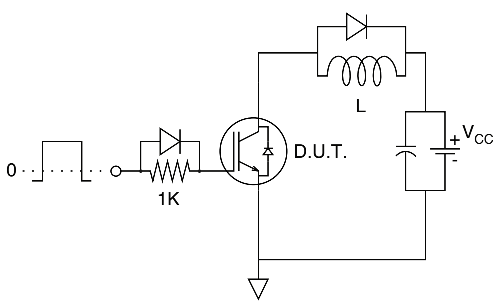


Fig. C.T.1 - Gate Charge Circuit (Turn-Off)

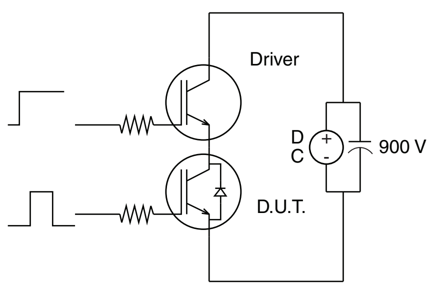


Fig. C.T.3 - S.C. SOA Circuit

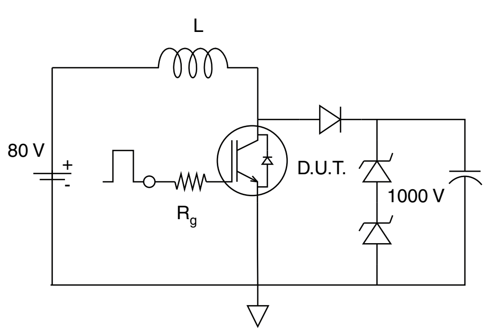


Fig. C.T.2 - RBSOA Circuit

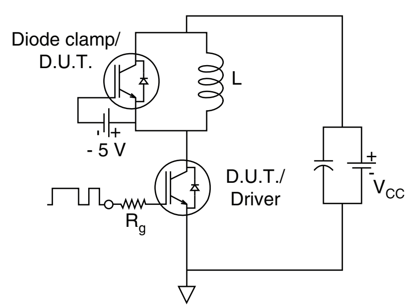


Fig. C.T.4 - Switching Loss Circuit

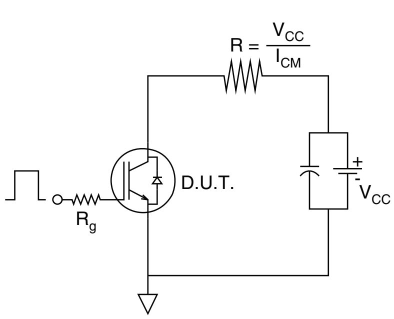
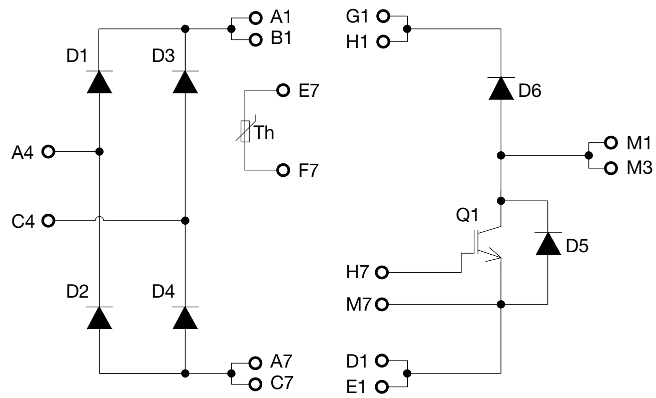


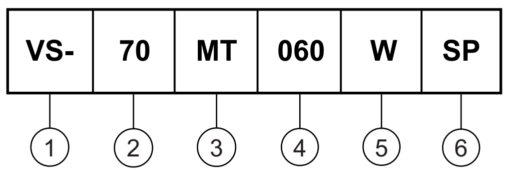
Fig. C.T.5 - Resistive Load Circuit

CIRCUIT CONFIGURATION



ORDERING INFORMATION

Device code

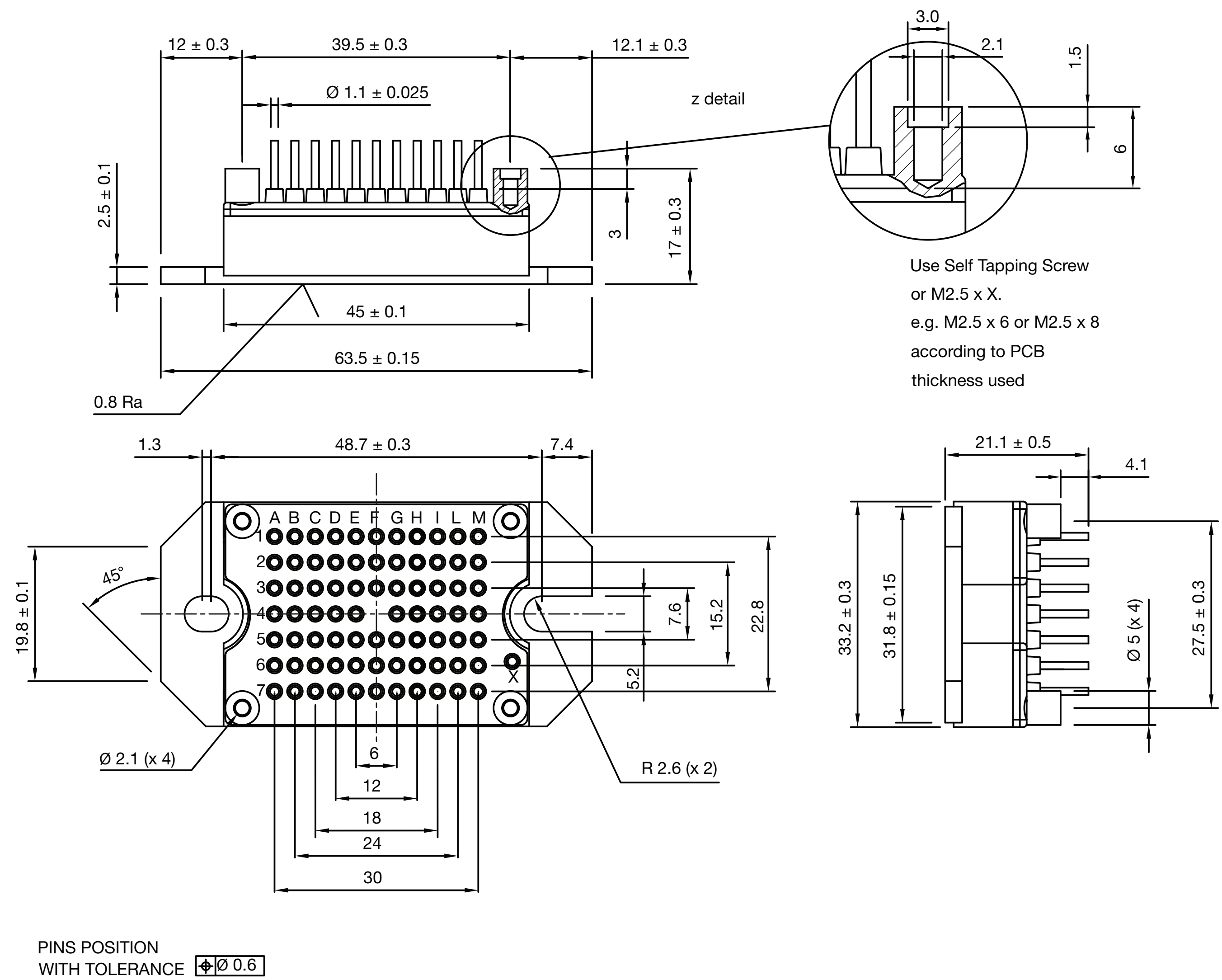


1	-	Vishay Semiconductors product
2	-	Current rating (70 = 70 A)
3	-	Essential part number (MT = MTP package)
4	-	Voltage code (060 = 600 V)
5	-	Die IGBT technology (W = Warp Speed IGBT)
6	-	Circuit configuration (SP = Single Phase Bridge plus PFC)

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95383

MTP - Full Pin

DIMENSIONS in millimeters



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.