

Molding Type Module

1200V/40A 2 in one-package

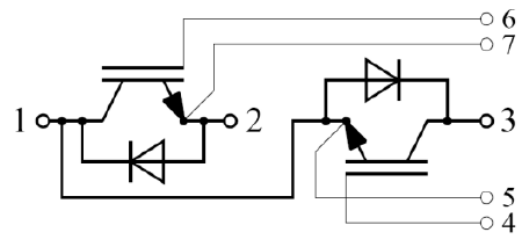
General Description

IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as electronic welders.



Features

- Low $V_{CE(sat)}$ trench IGBT technology
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175 $^{\circ}$ C
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology



Equivalent Circuit Schematic

Typical Applications

- Switching mode power supplies
- Electronic welders

Absolute Maximum Ratings $T_c=25^{\circ}$ C unless otherwise noted

Symbol	Description		Units
V _{CE} S	Collector-Emitter Voltage	1200	V
V _{GE} S	Gate-Emitter Voltage	± 20	V
I _C	Collector Current @ $T_c=25^{\circ}$ C T_{vj} max = 175 $^{\circ}$ C	40	A
I _{CM}	Pulsed Collector Current $t_p=1$ ms	80	A
I _F	Diode Continuous Forward Current	40	A
I _{FM}	Diode Maximum Forward Current $t_p=1$ ms	80	A
P _{tot}	Maximum Power Dissipation @ $T_j=175^{\circ}$ C	205	W
T _{jmax}	Maximum Junction Temperature	175	$^{\circ}$ C
T _{STG}	Storage Temperature Range	-40 to +125	$^{\circ}$ C
V _{ISO}	Isolation Voltage RMS, f=50Hz, t=1min	2500	V
Mounting Torque	Power Terminal Screw:M5 Mounting Screw:M6	2.5 to 5.0 3.0 to 5.0	N.m

Electrical Characteristics of IGBT $T_C=25^{\circ}\text{C}$ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$T_j=25^{\circ}\text{C}$	1200			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_j=25^{\circ}\text{C}$			1.5	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=\pm 20, V_{CE}=0\text{V}, T_j=25^{\circ}\text{C}$			100	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=2.4\text{mA}, V_{CE}=V_{GE}, T_j=25^{\circ}\text{C}$	5.0	-	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=40\text{A}, V_{GE}=15\text{V}, T_j=25^{\circ}\text{C}$	1.6	-	3.0	V
		$I_C=40\text{A}, V_{GE}=15\text{V}, T_j=125^{\circ}\text{C}$		2.0		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
$t_d(on)$	Turn-On Delay Time	$V_{CE}=600\text{V}, I_C=40\text{A}, R_G=10\Omega, V_{GE}=\pm 15\text{V}, T_j=25^{\circ}\text{C}$		65		ns	
t_r	Rise Time			95		ns	
$t_d(off)$	Turn-Off Delay Time			450		ns	
t_f	Fall Time			35		ns	
E_{on}	Turn-On Switching Loss				3.1		mJ
E_{off}	Turn-Off Switching Loss				2.3		mJ
$t_d(on)$	Turn-On Delay Time	$V_{CE}=600\text{V}, I_C=40\text{A}, R_G=10\Omega, V_{GE}=\pm 15\text{V}, T_j=125^{\circ}\text{C}$		60		ns	
t_r	Rise Time			80		ns	
$t_d(off)$	Turn-Off Delay Time			500		ns	
t_f	Fall Time			50		ns	
E_{on}	Turn-On Switching Loss				3.6		mJ
E_{off}	Turn-Off Switching Loss				2.6		mJ

Cies	Input Capacitance	V _{CE} =25V, f=1MHz, V _{GE} =0V		4.28		nF
C _{res}	Reverse Transfer Capacitance			0.13		nF
Q _G	Gate Charge	V _{GE} =-15V ...+15V		262		nC
R _{Gint}	Internal Gate Resistance			2.35		Ω
LCE	Stray Inductance				30	nH
R _{CC'+EE'}	Module Lead Resistance, Terminal To Chip			0.75		mΩ

Electrical Characteristics of Diode T_c=25°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V _F	Diode Forward Voltage	I _F =40A	T _j =25°C	2.5	-	7.0	V
Q _r	Recovered Charge	I _F =40A, V _R =600V,	T _j =25°C		0.5		μC
I _{RM}	Peak Reverse Recovery Current	R _G =20Ω, V _{GE} =-15V	T _j =25°C		10		A
E _{rec}	Reverse Recovery Energy		T _j =25°C		2.4		mJ

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
R _{thJC}	Junction-to-Case (per IGBT)		0.38	K/W
R _{thJC}	Junction-to-Case (per Diode)		0.58	K/W
R _{thCS}	Case-to-Sink (per IGBT -Conductive grease applied)	0.082		K/W
R _{thCS}	Case-to-Sink (per Diod-Conductive grease applied)	0.13		K/W

Package Dimensions

