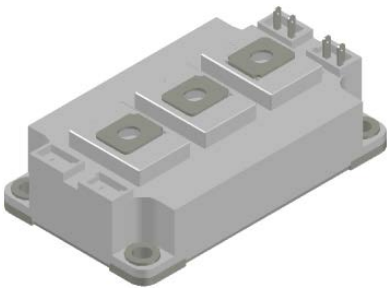
Filed Stop & Trench Type 1200V IGBT Module

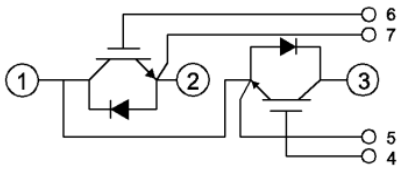
Description

The IGBT Module devices are optimized to reduce losses and switching noise in high frequency power conditioning electrical systems.

These IGBT Module series are ideally suited for Solar Inverters, Motor Drivers, Induction Heating, UPS, Welding Machine where switching losses are significant portion of the total losses.



D3



Equivalent Circuit

Features

- Low Conduction Loss: $V_{CE(sat)}$ = 1.7V@I_C=300A
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast & Soft Anti-Parallel FWD
- Maximum junction temperature 175℃
- Short Circuit rated:10us at T_C=100℃
- Isolated Type Package

Applications

- Solar Inverters
- Motor Drivers
- Induction Heating
- UPS (Uninterruptible Power Supplies)
- Welding Machine

IGBT Characteristics

Absolute Maximum Ratings

Symbol	Parameter	Conditions	Value	Unit
V_{CES}	Collector to Emitter Voltage	T_{vj}=25℃	1200	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C=25℃, T_{vjmax}=175℃	475	A
		T_C=100℃, T_{vjmax}=175℃	300	
I_{CRM}	Repetitive Peak Collector Current	t_p=1ms	600	A
P_D	Total Power Dissipation	T_C=25℃, T_{vjmax}=175℃	1250	W

Characteristic Values

Symbol	Parameter	Conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$V_{GE}=V_{CE}$, I_C =2mA,T_{vj}=25℃	5.0	-	6.5	V
I_{CES}	Collector-Emitter Cut-off Current	V_{CE}=1200V,V_{GE}=0V, T_{vj}=25℃	-	-	1.0	mA
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=300A,V_{GE}=15V, T_{vj}=25℃	-	1.7	2.2	V
		I_C=300A,V_{GE}=15V, T_{vj}=125℃	-	2.0	-	
		I_C=300A,V_{GE}=15V, T_{vj}=150℃	-	2.1	-	
Q_G	Gate Charge	V_{GE}= -15V … +15V	-	2.8	-	uC
C_{ies}	Input Capacitance	V_{CE}=25V,V_{GE} =0V, f=1MHz, T_{vj}=25℃	-	80	-	nF
C_{res}	Reverse Transfer Capacitance		-	0.9	-	nF
R_{gint}	Internal Gate Resistance	T_{vj}=25℃	-	2.55	-	Ω
I_{GES}	Gate-Emitter leakage current	V_{CE}=0 V, V_{GE}=20 V, T_{vj} = 25℃	-400	-	400	nA
$t_{d(on)}$	Turn-on Delay Time	I_C =300 A V_{CE} = 600 V V_{GE} = ±15V R_G =10Ω T_{vj}=25℃	-	580	-	ns
t_r	Rise Time		-	230	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	910	-	ns
t_f	Fall Time		-	120	-	ns
E_{on}	Energy Dissipation During Turn-on Time		-	69.6	-	mJ
E_{off}	Energy Dissipation During Turn-off Time		-	27.1	-	mJ
$t_{d(on)}$	Turn-on Delay Time	I_C =300 A V_{CE} = 600 V V_{GE} = ±15V R_G =10Ω T_{vj}=125℃	-	560	-	ns
t_r	Rise Time		-	270	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	940	-	ns
t_f	Fall Time		-	220	-	ns
E_{on}	Energy Dissipation During Turn-on Time		-	93.0	-	mJ
E_{off}	Energy Dissipation During Turn-off Time		-	33.0	-	mJ
t_{sc}	Short Circuit Withstand Time	V_{CC}=600V,V_{GE}=±15V R_G=10Ω @T_C=100℃	10	-	-	us
R_{thJC}	Thermal Resistance Junction to Case	per IGBT	-	-	0.12	℃/W

Diode Characteristics

Absolute Maximum Ratings

Symbol	Parameter	Conditions	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	T_{vj}=25℃	1200	V
I_F	Continuous DC Forward Current		300	A
I_{FRM}	Repetitive Peak Forward Current	t_p=1ms	600	A

Characteristic Values

Symbol	Parameter	Conditions	Value			Unit
			Min.	Typ.	Max.	
V_F	Forward Voltage	I_F=300A,T_{vj}=25℃	-	1.90	2.5	V
		I_F=300A,T_{vj}=125℃	-	1.75	-	
		I_F=300A,T_{vj}=150℃	-	2.10	-	
Q_{rr}	Recovered Charge	I_F =300A V_R=600V di_F/d_t =-200A/us T_{vj}=25℃	-	3.0	-	uC
I_{rr}	Peak Reverse Recovery Current		-	30	-	A
E_{rec}	Reverse Recovery Energy		-	13.0	-	mJ
Q_{rr}	Recovered Charge	I_F =300A V_R=600V di_F/d_t =-200A/us T_{vj}=125℃	-	22	-	uC
I_{rr}	Peak Reverse Recovery Current		-	45	-	A
E_{rec}	Reverse Recovery Energy		-	19.4	-	mJ
R_{thJC}	Thermal Resistance Junction to Case	per Diode	-	-	0.25	℃/W

Module Characteristics T_C=25℃ unless otherwise specified

Symbol	Parameter	Conditions	Value			Unit
			Min.	Typ.	Max.	
V_{isol}	Isolation voltage	t=1min, f=50Hz	2500	-	-	V
$T_{vj\ op}$	Operating Junction Temperature		-55	-	175	℃
T_{stg}	Storage Temperature		-40	-	150	℃
L_{CE}	Stray Inductance		-	55	-	nH
$R_{cc'+EE'}$	Module Lead Resistance, Terminal to Chip	T_C=25℃, per switch	-	1.2	-	mΩ
R_{thCS}	Thermal Resistance Case to Sink	per Package	-	0.02	-	℃/W
M_s	Module-to-Sink Torque (M6)		3.0	-	6.0	N·m
G	Weight of Module		-	300	-	g

Typical Performance Characteristics

Fig. 1. Typical Output Characteristics

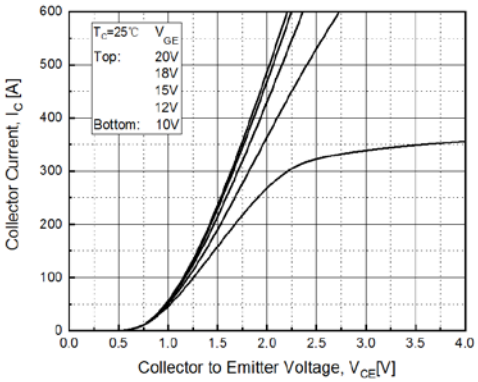


Fig. 2. Typical Output Characteristics

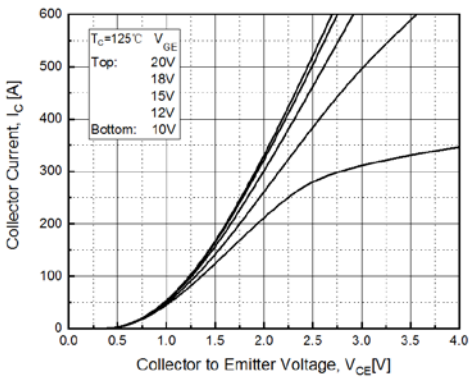


Fig. 3. Typical Saturation Voltage Characteristics

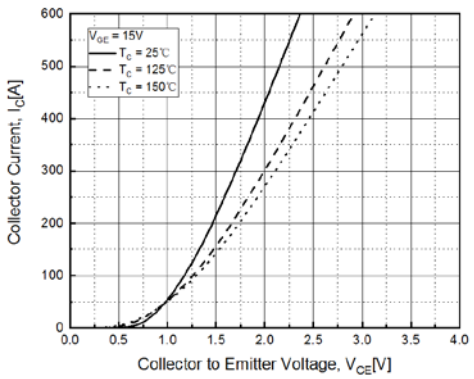


Fig. 4. Typical Transfer Characteristics

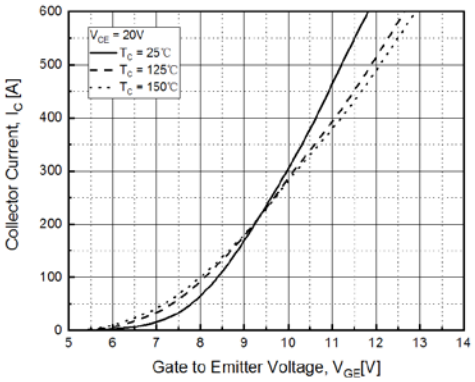


Fig. 5. Turn-on losses vs. R_G

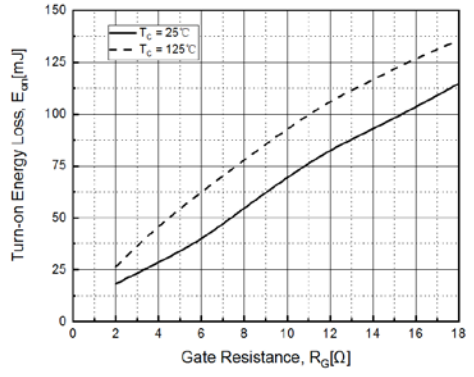
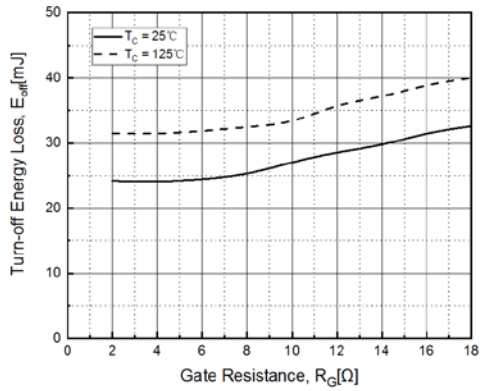


Fig. 6. Turn-off losses vs. R_G



Typical Performance Characteristics

Fig. 7. Reverse Bias Safe Operating Area

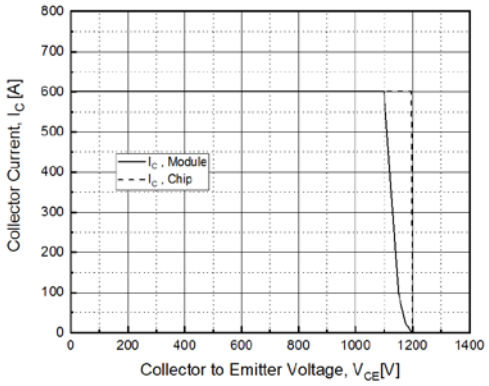


Fig. 8. Forward Characteristics of Diode

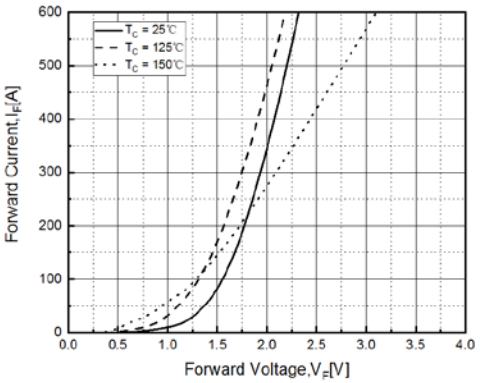


Fig. 9. Reverse Recovery Loss Characteristics vs. R_G

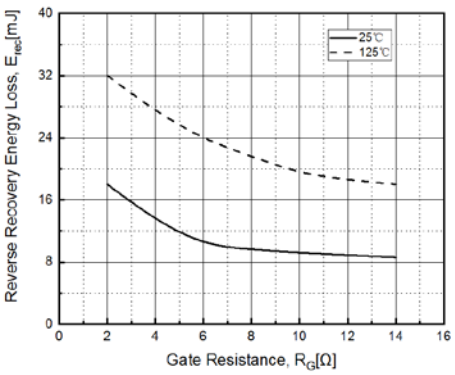
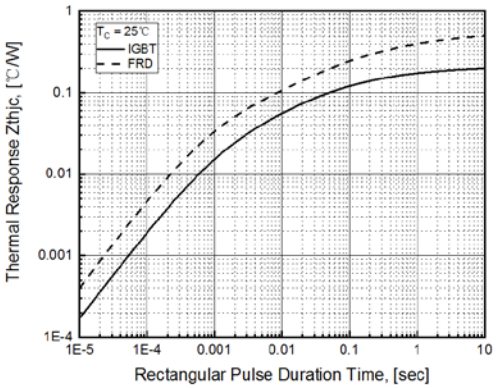
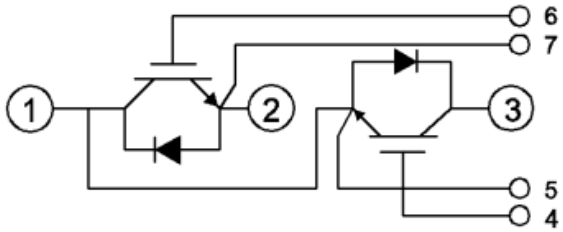


Fig. 10. Transient Thermal Impedance



Circuit Diagram



Package Dimensions