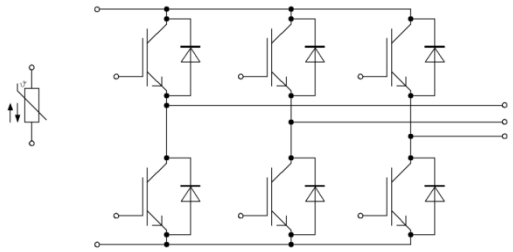
1200V 200A IGBT Power Module

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 Motor Drivers, Servo Drivers.



Equivalent Circuit

Features

- Low Vce(sat)
- Trench IGBT
- Maximum junction temperature 150℃
- Al_2O_3 Substrate with Low Thermal Resistance
- Copper Base Plate
- Standard Housing

Applications

- Motor Drivers
- Servo Drivers

IGBT- inverter

Absolute Maximum Ratings

Symbol	Parameter	Conditions	Value	Unit
V_{CES}	Collector to Emitter Voltage	V_{GE}=0V, I_C =1mA, T_{vj}=25℃	1200	V
I_C	Continuous Collector Current	T_C=25℃, T_{vjmax}=175℃	285	A
I_{CRM}	Repetitive Peak Collector Current	t_p=1ms	400	A
V_{GES}	Gate-Emitter Voltage	T_{vj}=25℃	±20	V
P_{tot}	Total Power Dissipation	T_C=25℃,T_{vjmax}=175℃	1000	W

Characteristic values

Symbol	Parameter	Conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$V_{GE}=V_{CE}$, I_C =1mA,T_{vj}=25℃	5.2	5.6	6.4	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=200A,V_{GE}=15V, T_{vj}=25℃		1.77	2.15	V
		I_C=200A,V_{GE}=15V, T_{vj}=125℃		2.13		
		I_C=200A,V_{GE}=15V, T_{vj}=150℃		2.21		
Q_G	Gate Charge	V_{CE}=-15V…+15V		1.68		uC
C_{ies}	Input Capacitance	V_{CE}=25V,V_{GE} =0V, f=1MHz, T_{vj}=25℃		14.2		nF
C_{res}	Reverse Transfer Capacitance			0.48		nF
R_{gint}	Internal Gate Resistance	T_{vj}=25℃		3.5		Ω
I_{GES}	Gate-Emitter leakage current	V_{CE}=0 V, V_{GE}=20 V, T_{vj} = 25℃			400	nA
$t_{d(on)}$	Turn-on Delay Time	I_C =200 A V_{CE} = 600 V V_{GE} = ±15V R_G =1.1Ω T_{vj}=25℃		142		ns
t_r	Rise Time			34		ns
$t_{d(off)}$	Turn-off Delay Time			323		ns
t_f	Fall Time			88		ns
E_{on}	Energy Dissipation During Turn-on Time			10.4		mJ
E_{off}	Energy Dissipation During Turn-off Time			11.1		mJ
$t_{d(on)}$	Turn-on Delay Time	I_C =200 A V_{CE} = 600 V V_{GE} = ±15V R_G =1.1Ω T_{vj}=125℃		148		ns
t_r	Rise Time			38		ns
$t_{d(off)}$	Turn-off Delay Time			396		ns
t_f	Fall Time			154		ns
E_{on}	Energy Dissipation During Turn-on Time			18.0		mJ
E_{off}	Energy Dissipation During Turn-off Time			16.1		mJ
I_{sc}	SC Data	T_p≤10us,V_{GE}=15V,T_{vj}=150℃, V_{cc}=800V,V_{CEM}≤1200V		800		A

Diode- inverter

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		200	A
I_{FRM}	Repetitive Peak Forward Current	t_p=1ms	400	A

Characteristic values

Symbol	Parameter	Conditions	Value			Unit
			Min.	Typ.	Max.	
V_F	Forward Voltage	I_F=200A,T_{vj}=25℃		1.75	2.15	V
		I_F=200A,T_{vj}=125℃		1.70		
		I_F=200A,T_{vj}=150℃		1.70		
Q_{rr}	Recovered Charge	I_F =200A V_R=600V -di$_F$/d$_t$ =5000A/us T_{vj}=25℃		18.1		uC
I_{rr}	Peak Reverse Recovery Current			233		A
E_{rec}	Reverse Recovery Energy			8.4		mJ
Q_{rr}	Recovered Charge	I_F =200A V_R=600V -di$_F$/d$_t$ =5000A/us T_{vj}=125℃		32.8		uC
I_{rr}	Peak Reverse Recovery Current			247		A
E_{rec}	Reverse Recovery Energy			14.8		mJ

NTC- Thermistor

Characteristic values

Symbol	Parameter	Conditions	Value			Unit
			Min.	Typ.	Max.	
R_{25}	Rated resistance	T_C=25℃		5.0		kΩ
△R/R	Deviation of R_{100}	T_C=100℃, R_{100}=493Ω	-5		5	%
P_{25}	Power dissipation	T_C=25℃			18.0	mW
$B_{25/50}$	B-Value	R_2= R_{25}exp[$B_{25/50}$(1/T_2-1/(298, 15K))]		3369		K
$B_{25/80}$		R_2= R_{25}exp[$B_{25/80}$(1/T_2-1/(298, 15K))]		3417		
$B_{25/100}$		R_2= R_{25}exp[$B_{25/100}$(1/T_2-1/(298, 15K))]		3442		

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_{jmax}	Maximum Junction Temperature	Inverter			175	℃
$T_{vj\ op}$	Operating Junction Temperature		-40		150	℃
T_{stg}	Storage Temperature		-40		125	℃
L_{CE}	Stray Inductance			21		nH
$R_{cc'+EE'}$	Module Lead Resistance, Terminal to Chip	T_C=25℃, per switch		1.8		mΩ
$R_{AA'+CC'}$				3.0		
$R_{\theta jc}$	Thermal Resistance Junction to Case	per IGBT-inverter			0.16	K/W
		per Diode-inverter			0.23	
$R_{\theta CS}$	Thermal Resistance Case to Sink	per IGBT-inverter		0.081		K/W
		per Diode-inverter		0.163		
		per Module		0.009		
M_s	Module-to-Sink Torque		3.0		6.0	N・m
G	Weight of Module			300		g

Typical Performance Characteristics

Fig. 1. Typical Output Characteristics

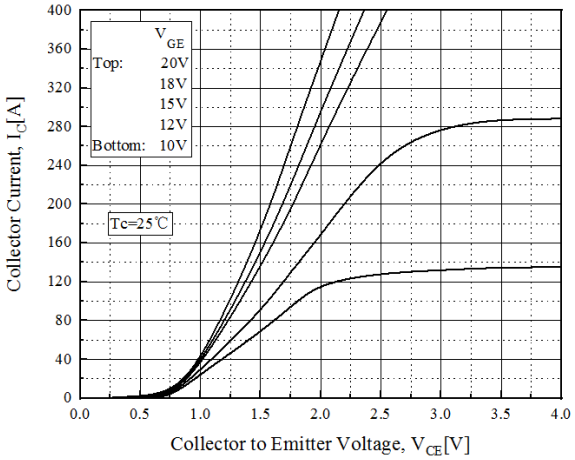


Fig. 2. Typical Output Characteristics

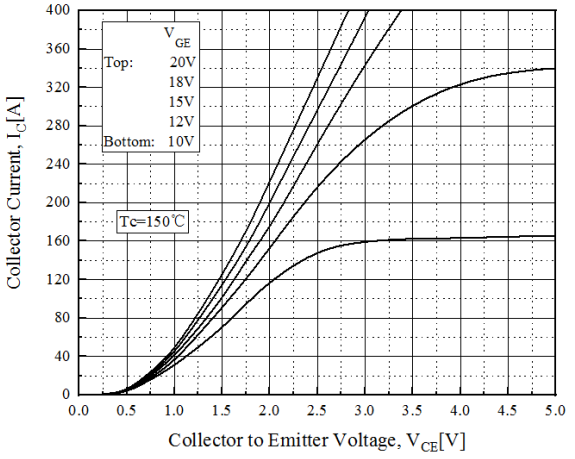


Fig. 3. Typical Saturation Voltage Characteristics

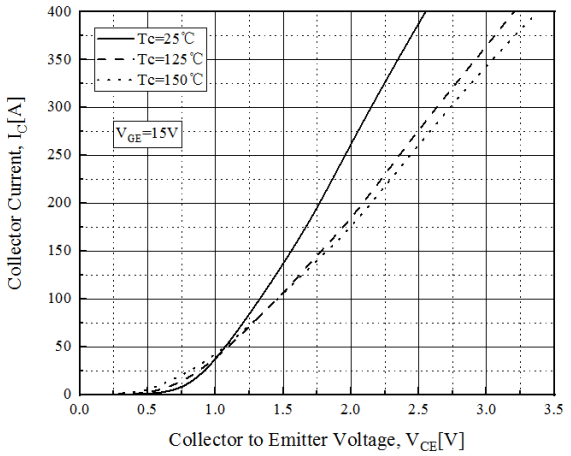


Fig. 4. Typical Transfer Characteristics

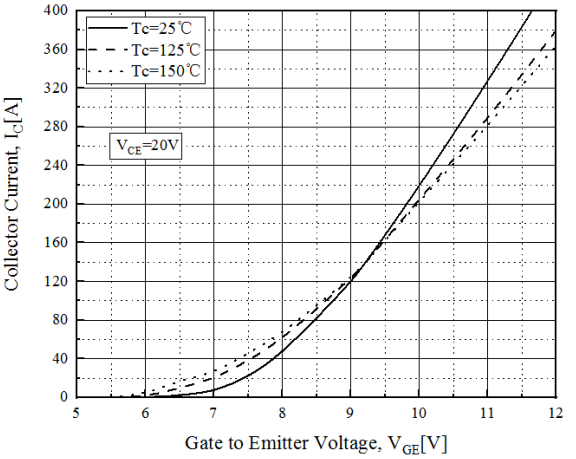


Fig. 5. Switching Loss Characteristics vs. R_G

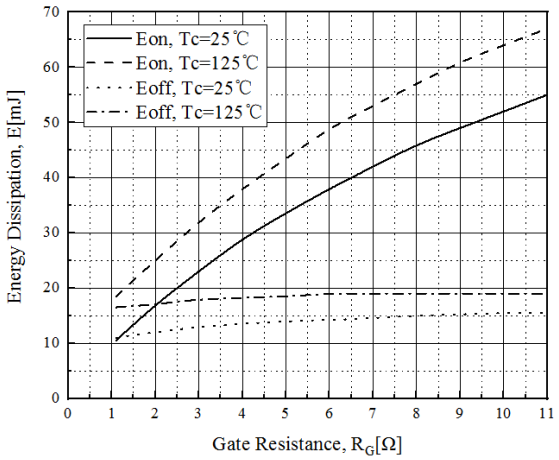
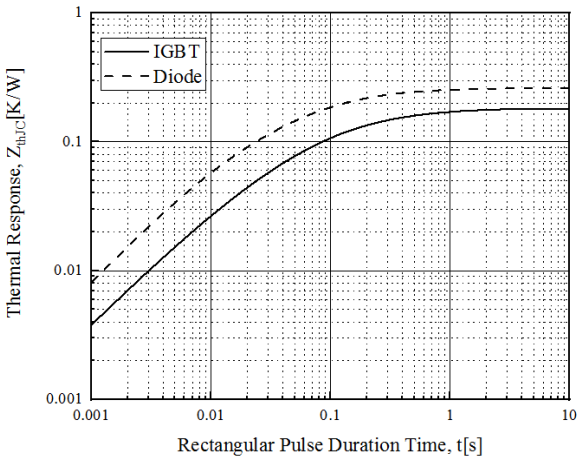


Fig. 6. Transient Thermal Impedance



Typical Performance Characteristics

Fig. 7. Forward Characteristics of Diode

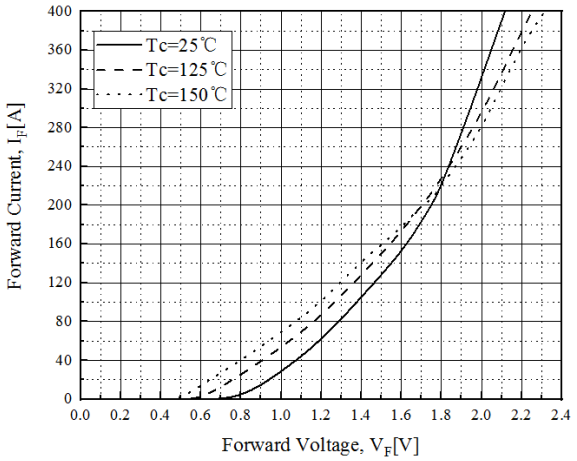


Fig. 8. Reverse Recovery Loss Characteristics vs. R_G

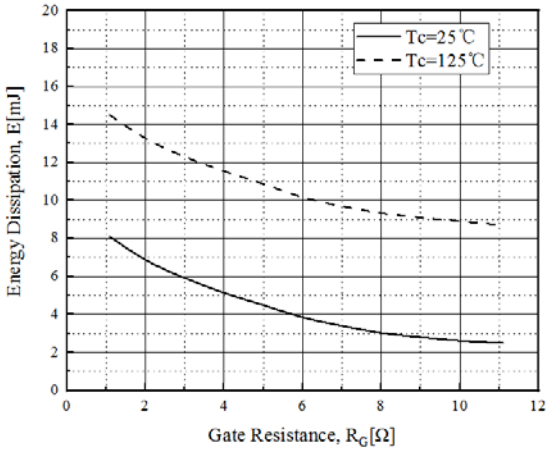


Fig. 9. Reverse Bias Safe Operating Area

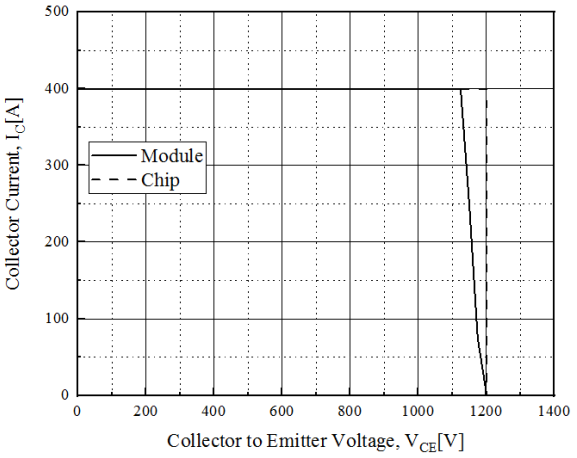
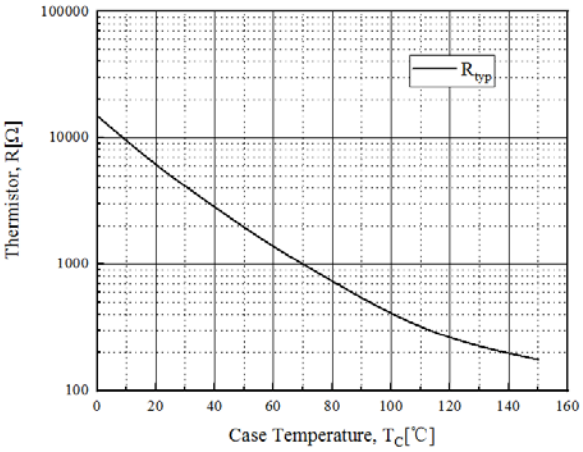
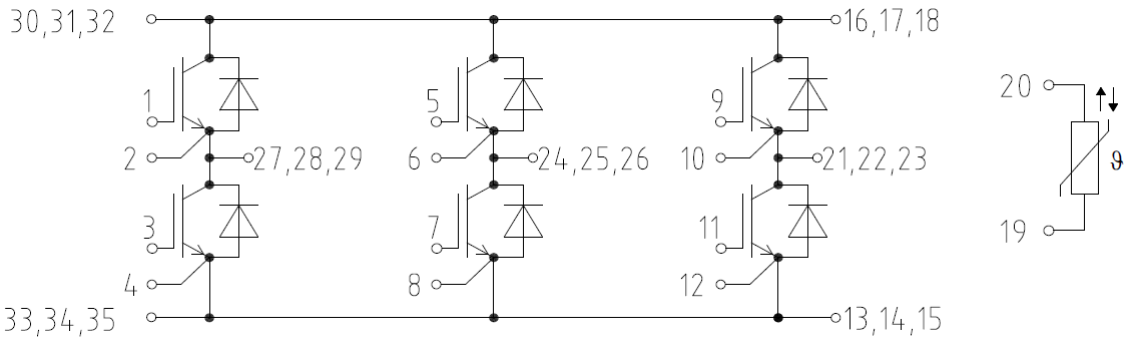


Fig. 10. NTC-Thermistor-temperature characteristic



Circuit Diagram



Package Dimensions