

General Description

IGBT power module provides ultra low conduction loss as well as short circuit ruggedness. It is designed for applications such as general SMPS and UPS.

Features

- ✓ Soft Punch Through(SPT+) Technology
- ✓ Fast & Soft inverse CAL Diodes
- ✓ Positive Temperature Coefficient
- ✓ Short Circuit Ruggedness
- ✓ $V_{CES}=1200V$
- ✓ $I_C=100A$

Application

- ✓ Switching Mode Power Supplies(SMPS)
- ✓ High Power Inverter
- ✓ UPS, Robotics
- ✓ Electrical Welding Machine

preliminary data

Package : S3



Absolute Maximum Ratings ($T_C=25^{\circ}C$, unless otherwise noted.)

Symbol	Parameter	Conditions	Values	Units
V_{CES}	collector-emitter voltage	$V_{GE}=0, T_j \geq 25^{\circ}C$	1,200	V
V_{GES}	gate-emitter peak voltage	-	± 20	V
$I_{C(AV)}$	DC collector current	$T_C=80^{\circ}C$	100	A
I_{CRM}	repetitive peak collector current	$T_C=80^{\circ}C, t_p=1ms$	200	A
$I_{F(AV)}$	DC forward current	$T_C=80^{\circ}C$	100	A
I_{FRM}	repetitive peak forw. current	10 ms, sin 180°	1,000	A
P_D	total power dissipation	$T_C=25^{\circ}C$	690	W
		$T_C=80^{\circ}C$	380	W
t_{SC}	short circuit withstand time	$V_{CC}=900V, V_{CES}=1200V, V_{GE}=15V, T_j=125^{\circ}C$	10	μs
$T_{j(max)}$	maximum junction temperature	-	-40 ~ 150	$^{\circ}C$
T_{stg}	storage temperature	-	-40 ~ 125	$^{\circ}C$
V_{ISOL}	isolation test voltage	RMS, f=50Hz, t=1 minutes	2,500	V
Weight	module	-	320	g
-	terminal mounting torque (M6)	Typical	4.5	N.m

Static Characteristics ($T_C=25^\circ\text{C}$, unless otherwise noted.)

Symbol	Parameter	min.	typ.	max.	Units	Conditions
BV_{CES}	collector-emitter breakdown voltage	1,200	-	-	V	$I_C=1\text{mA}$, $V_{GE}=0\text{V}$, $T_J=25^\circ\text{C}$
I_{CES}	collector-emitter cut-off current	-	-	200	μA	$V_{CE}=1200\text{V}$, $V_{GE}=0\text{V}$
I_{GES}	gate-emitter Leakage Current	-400	-	400	nA	$V_{CE}=0\text{V}$, $V_{GE}=\pm 20\text{V}$
$V_{GE(th)}$	gate-emitter threshold voltage	5.0	6.0	7.0	V	$V_{GE}=V_{CE}$, $I_C=4\text{mA}$
$V_{CE(SAT)}$	collector-emitter saturation voltage	-	1.9	2.2	V	$I_C=100\text{A}$, $V_{GE}=15\text{V}$, $T_C=25^\circ\text{C}$
		-	2.1	-	V	$I_C=100\text{A}$, $V_{GE}=15\text{V}$, $T_C=125^\circ\text{C}$
R_{Gint}	internal gate resistance	-	5	-	Ω	

Electrical Characteristics ($T_C=25^\circ\text{C}$, unless otherwise noted.)

Symbol	Parameter	min.	typ.	max.	Units	Conditions
$t_{d(on)}$	turn-on delay time	-	320	-	ns	$V_{DC}=600\text{V}$, $I_C=100\text{A}$, $R_G=18\Omega$, $V_{GE}=\pm 15\text{V}$, $L=60\text{nH}$, Inductive Load, $T_J=25^\circ\text{C}$
t_r	rise time	-	140	-	ns	
$t_{d(off)}$	turn-off delay time	-	485	-	ns	
t_f	fall time	-	100	-	ns	
E_{ON}	turn-on switching loss	-	TBD	-	mJ	
E_{OFF}	turn-off switching Loss	-	TBD	-	mJ	
$t_{d(on)}$	turn-on delay time	-	345	-	ns	$V_{DC}=600\text{V}$, $I_C=100\text{A}$, $R_G=18\Omega$, $V_{GE}=\pm 15\text{V}$, $L=60\text{nH}$, Inductive Load, $T_J=125^\circ\text{C}$
t_r	rise time	-	140	-	ns	
$t_{d(off)}$	turn-off delay time	-	560	-	ns	
T_f	fall time	-	140	-	ns	
E_{ON}	turn-on switching loss	-	TBD	-	mJ	
E_{OFF}	turn-off switching loss	-	TBD	-	mJ	
Q_g	total gate charge	-	1220	-	nC	$V_{CE}=600\text{V}$, $I_C=100\text{A}$, $V_{GE}=\pm 15\text{V}$
C_{ies}	input capacitance	-	8.6	-	nF	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$ $f=1\text{MHz}$, $T_J=25^\circ\text{C}$
C_{oes}	output capacitance	-	1.0	-	nF	
C_{res}	reverse transfer capacitance	-	0.4	-	nF	

Electrical Characteristics of Diode

Symbol	Parameter	min.	typ.	max.	Units	Conditions
V _F	forward voltage	-	1.5	1.8	V	T _C = 25°C, I _F = 75A
		-	1.5	-	V	T _C = 150°C, I _F = 75A
I _{RM}	peak reverse recovery current	-	97	-	A	T _j =150°C, 100A, 600V, 2,000A/us
E _{rec}	reverse recovery current	-	5.4	-	mJ	
T _{rr}	diode reverse recovery time	-	0.27	-	us	

Thermal Characteristics

Symbol	Parameter	min.	typ.	max.	Units	Conditions
Rth(j-c)	junction-to-case (IGBT Part, Per 1/2 Module)	-	-	0.18	K/W	
Rth(j-c)	junction-to-case (FRD Part, Per 1/2 Module)	-	-	0.35	K/W	
Rth(c-f)	case-to-heat sink (with thermal compound)	-	0.05	-	K/W	

Performance Curves

Fig.1 IGBT output characteristics (typical)@ $T_C = 25^\circ\text{C}$

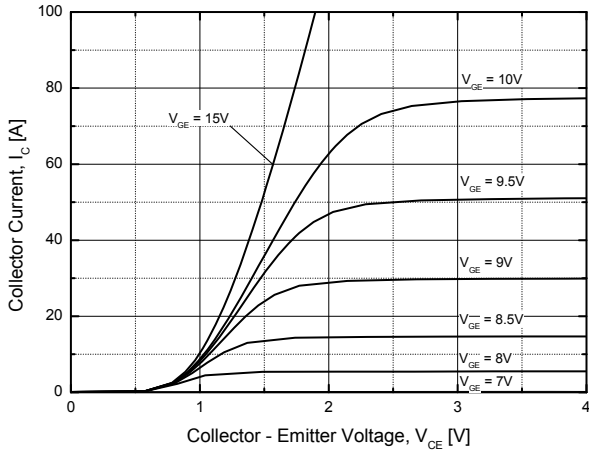


Fig.2 IGBT output characteristics (typical)@ $T_C = 125^\circ\text{C}$

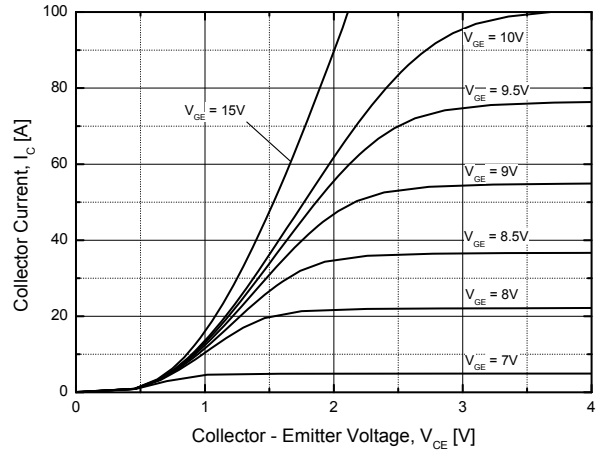


Fig.3 IGBT output characteristics, $V_{CE(SAT)}$ (typical)

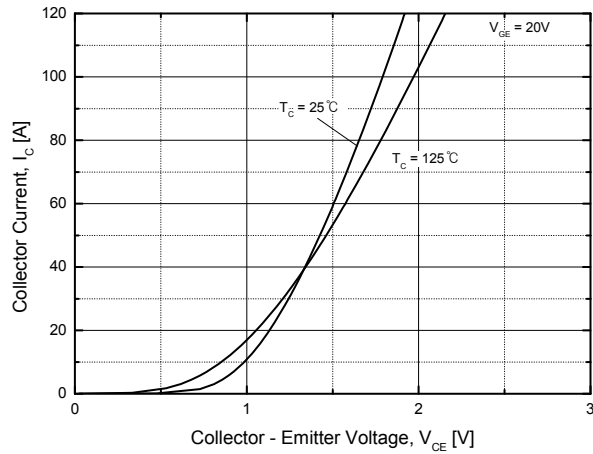


Fig.4 Diode forward characteristics (typical)

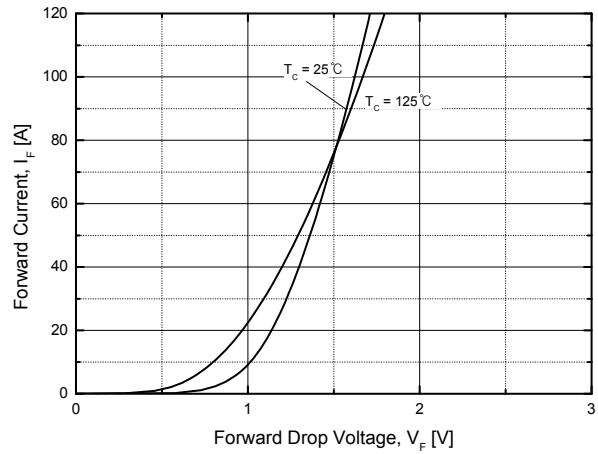


Fig.5 Capacitance (typical)

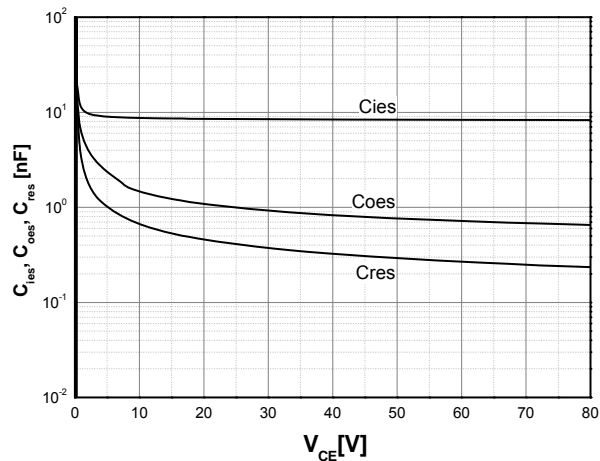


Fig.6 Gate charge characteristics (typical)

