

GSID150A120S6A4

IGBT Module



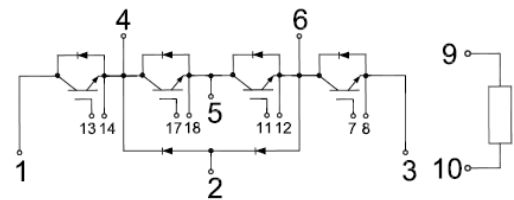
Features:

- Short Circuit Rated 10 μ s
- Low Saturation Voltage: $V_{CE(sat)} = 1.90V @ I_C = 150A, T_C=25^\circ C$
- Low Switching Loss
- 100% RBSOA Tested ($2 \times I_C$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Application:

- 3-Level-Applications



IGBT, Inverter

Maximum Rated Values ($T_C=25^\circ C$ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C = 80^\circ C$	150	A
		$T_C = 25^\circ C$	275	A
I_{CM}	Repetitive Peak Collector Current	$T_C = 175^\circ C$	300	A
t_{SC}	Short Circuit Withstand Time		>10	μ s
P_D	Maximum Power Dissipation per IGBT	$T_C = 25^\circ C$	1035	W
		$T_{Jmax}=175^\circ C$		

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

Static characteristics

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C = 3\text{ mA}, V_{CE} = V_{GE}$	4.5	5.5	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 150\text{A}, V_{GE} = 15\text{V}$	1.90	2.10	1.90	V
			2.20		2.10	V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE} = 0\text{V}, V_{CE} = V_{CES}, T_J = 25^\circ\text{C}$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE} = 0\text{V}, V_{CE} = V_{CES}, T_J = 25^\circ\text{C}$			200	nA
C_{ies}	Input Capacitance	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		20.2		nF
C_{oes}	Output capacitance			1.15		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600\text{V}, I_C = 150\text{A}, R_G = 6.2\Omega, V_{GE} = \pm 15\text{V},$ Inductive Load	$T_J = 25^\circ\text{C}$		235		ns
			$T_J = 125^\circ\text{C}$		220		
t_r	Rise Time		$T_J = 25^\circ\text{C}$		115		ns
			$T_J = 125^\circ\text{C}$		120		
$t_{d(off)}$	Turn-off Delay Time		$T_J = 25^\circ\text{C}$		360		ns
			$T_J = 125^\circ\text{C}$		380		
t_f	Fall Time		$T_J = 25^\circ\text{C}$		160		ns
			$T_J = 125^\circ\text{C}$		230		
E_{on}	Turn-on Switching Loss		$T_J = 25^\circ\text{C}$		9.1		mJ
			$T_J = 125^\circ\text{C}$		12.2		
E_{off}	Turn-off Switching Loss	$T_J = 25^\circ\text{C}$		7.5		mJ	
		$T_J = 125^\circ\text{C}$		11.5			
Q_g	Total Gate Charge	$T_J = 25^\circ\text{C}$		1230		nC	
R_g	Internal Gate Resistance	$T_J = 25^\circ\text{C}$		4.7		Ω	

RBSOA	Reverse Bias Safe Operation Area	$I_C=300A, V_{CC}=1050V, V_p=1200V,$ $R_g = 6.2\Omega, V_{GE}=+15V \text{ to } 0V, T_J = 150^\circ C$	Trapezoid		
SCSOA	Short Circuit Safe Operation Area	$V_{CC} = 600V, V_{GE} = 15V,$ $T_J = 150^\circ C$	10		μs
$R_{\theta JC}$	Junction-To-Case		0.145		$^\circ C/W$

Diode, Inverter

Maximum Rated Values ($T_C=25^\circ C$ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	150	A
I_{FM}	Diode Maximum Forward Current	300	A

Electrical Characteristics of FWD ($T_C=25^\circ C$ unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
V_{FM}	Forward Voltage	$I_C = 150A,$ $V_{GE} = 15V$	$T_J = 25^\circ C$	2.00		V
			$T_J = 125^\circ C$	2.20		
I_{rr}	Peak Reverse Recovery Current	$I_F=150A,$ $di/dt = 1500A/\mu s,$ $V_{rr} = 600V,$ $V_{GE} = -15V$	$T_J = 25^\circ C$	65		A
			$T_J = 125^\circ C$	90		
Q_{rr}	Reverse Recovery Charge	$I_F=150A,$ $di/dt = 1500A/\mu s,$ $V_{rr} = 600V,$ $V_{GE} = -15V$	$T_J = 25^\circ C$	6.5		μC
			$T_J = 125^\circ C$	13.8		
E_{rec}	Reverse Recovery Energy	$I_F=150A,$ $di/dt = 1500A/\mu s,$ $V_{rr} = 600V,$ $V_{GE} = -15V$	$T_J = 25^\circ C$	2.6		mJ
			$T_J = 125^\circ C$	4.8		
$R_{\theta JC}$	Junction-To-Case			0.286		$^\circ C/W$

Diode, 3-Level

Maximum Rated Values ($T_C=25^\circ C$ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
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I_F	Diode Continuous Forward Current	150	A
I_{FM}	Diode Maximum Forward Current	300	A

Electrical Characteristics of FWD ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
V_{FM}	Forward Voltage	$I_C = 150\text{A}$, $V_{GE} = 15\text{V}$	$T_J = 25^\circ\text{C}$		2.00	V
			$T_J = 125^\circ\text{C}$		2.20	
I_{rr}	Peak Reverse Recovery Current	$I_F = 150\text{A}$, $di/dt = 1500\text{A}/\mu\text{s}$, $V_{rr} = 600\text{V}$, $V_{GE} = -15\text{V}$	$T_J = 25^\circ\text{C}$		65	A
			$T_J = 125^\circ\text{C}$		90	
Q_{rr}	Reverse Recovery Charge		$T_J = 25^\circ\text{C}$		6.5	μC
			$T_J = 125^\circ\text{C}$		13.8	
E_{rec}	Reverse Recovery Energy		$T_J = 25^\circ\text{C}$		2.6	mJ
			$T_J = 125^\circ\text{C}$		4.8	
$R_{\theta JC}$	Junction-To-Case			0.286		$^\circ\text{C}/\text{W}$

Internal NTC- Thermistor Characteristic

Symbol	Condition	Typ.	Max.	Units
R_{25}	$T_C = 25^\circ\text{C}$	5		k Ω
$\Delta R/R$	$T_C = 100^\circ\text{C}$, $R_{100} = 1481\text{K}\Omega$		± 5	%
P_{25}	$T_C = 25^\circ\text{C}$	50		mW
$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298.15\text{K}))]$	3380		K
$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2 - 1/(298.15\text{K}))]$	3440		K

Module

	Description	Min	Typ	Max	Unit
V _{iso}	Isolation Voltage(All Terminals Shorted) f = 50Hz, 1minute	2500			V
T _J	Maximum Junction Temperature			175	°C
T _{JOP}	Maximum Operating Junction Temperature Range	-40		+150	°C
T _{stg}	Storage Temperature	-40		+125	°C
R _{θCS}	Case-To-Sink (Conductive Grease Applied)		0.03		°C/W
T	Power Terminals Screw:M6	3.0		5.0	N·m
	Mounting Screw:M6	4.0		6.0	
G	Weight		345		g

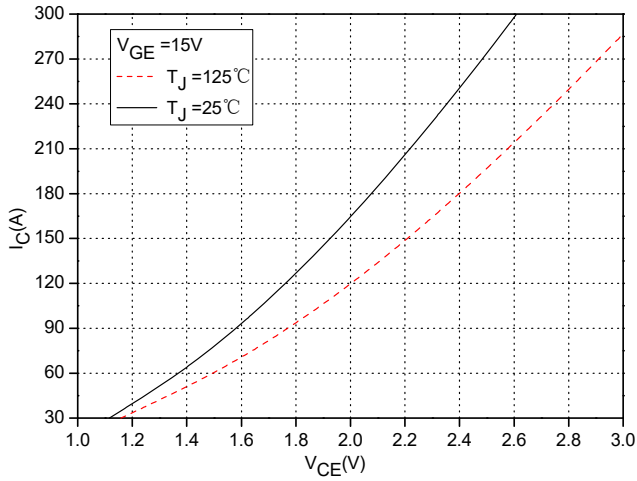


Fig.1 Typical Saturation Voltage Characteristics

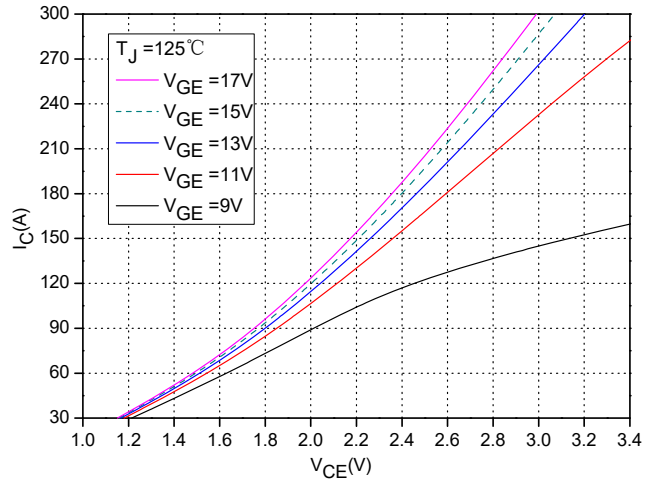


Fig.2 Typical Output Characteristics

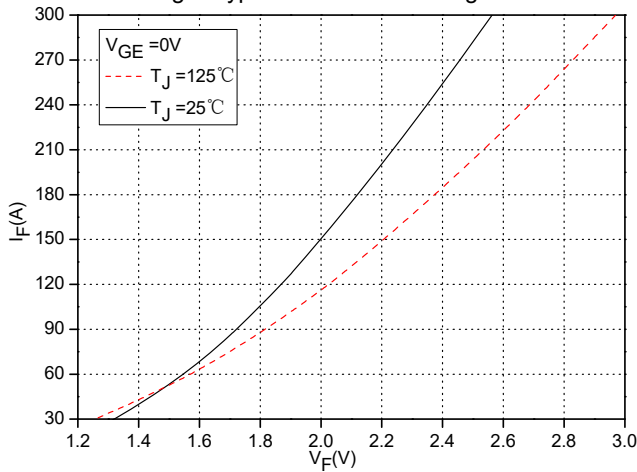


Fig.3 Forward Characteristics of Diode (Reverse)

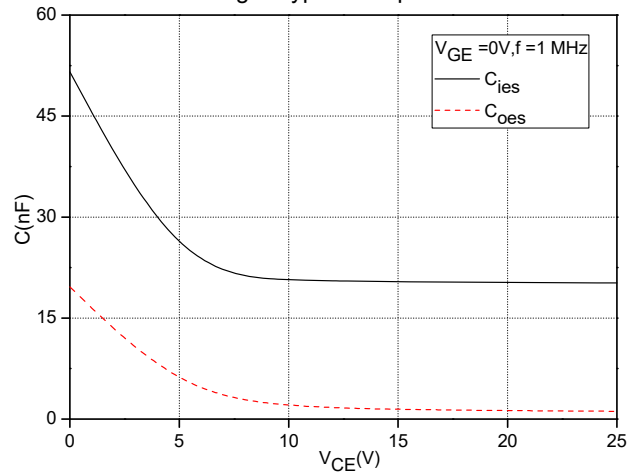


Fig.4 Capacitance Characteristics

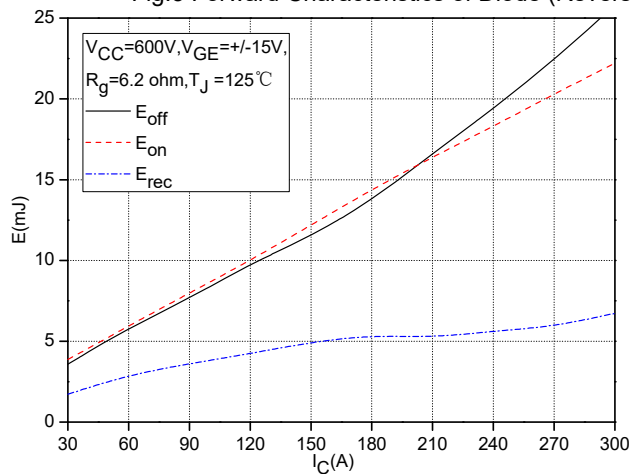


Fig.5 Typical Switching Loss vs. Collector Current

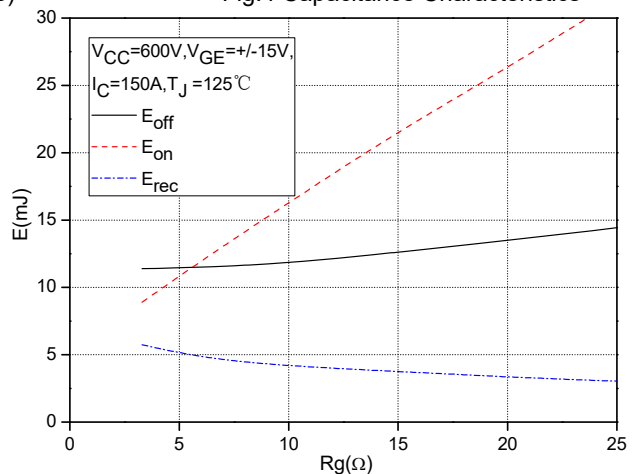


Fig.6 Typical Switching Loss vs. Gate Resistance

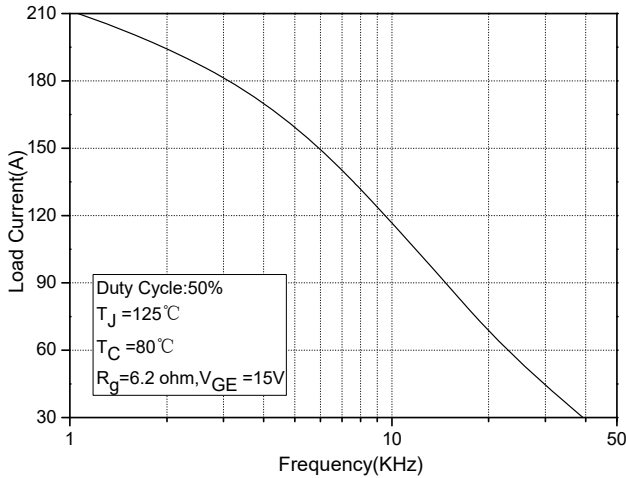


Fig.7 Typical Load Current vs. Frequency

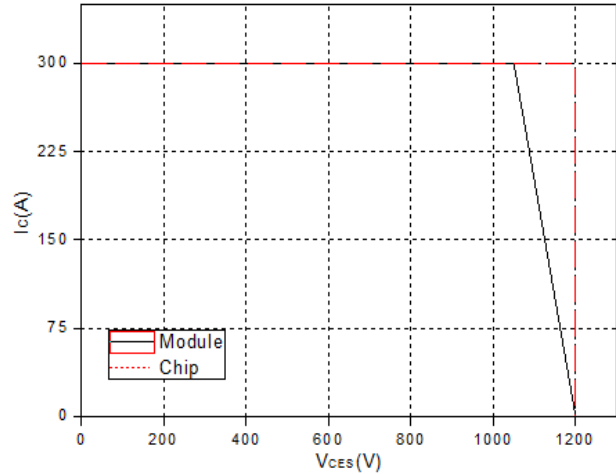


Fig.8 Reverse Bias Safe Operation Area (RBSOA)

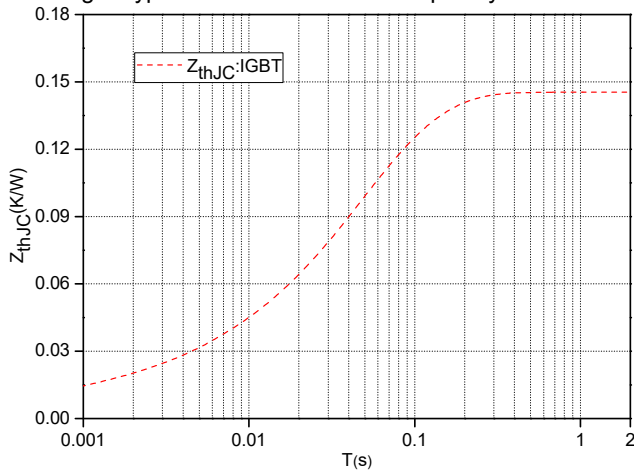


Fig.9 Transient thermal impedance (IGBT)

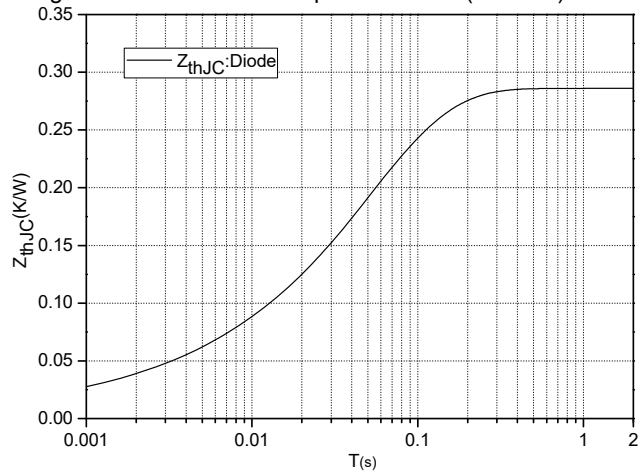


Fig.10 Transient thermal impedance (Diode)

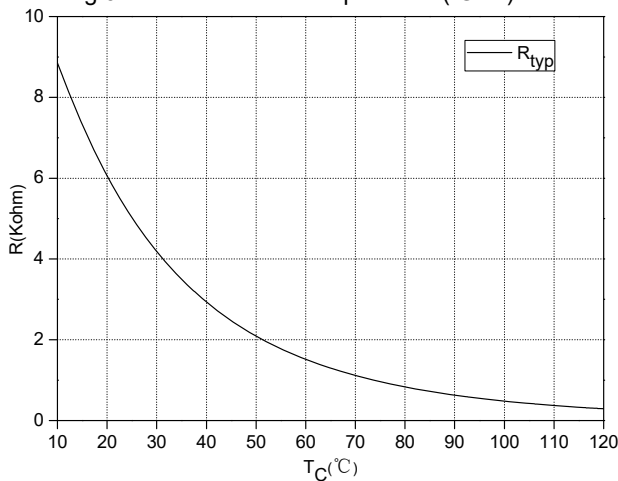


Fig.11 NTC Temperature characteristics

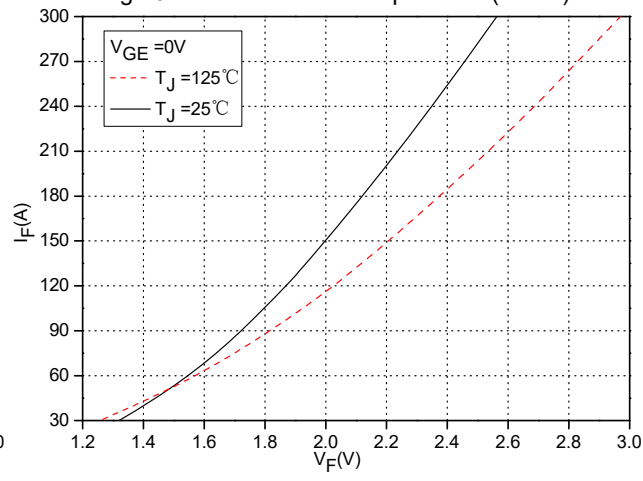


Fig.12 Forward Characteristics (Diode, 3-Level)

Revision History

Date	Revision	Notes
12/22/2015	0.1	Initial release
01/03/2020	0.2	Applied company name change

Notes

RoHS Compliance

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.SemiQ.com.

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