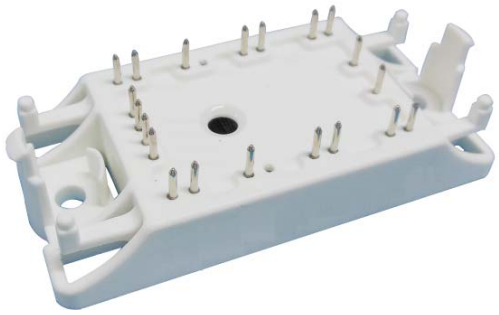
GSID080A120B1A5

IGBT Module

RoHS

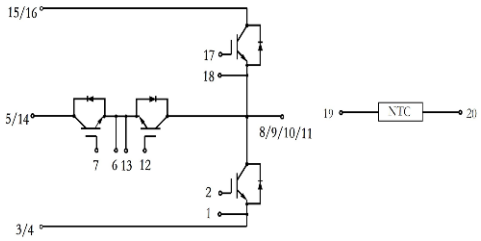
Features:

- Low Switching Loss
- Low Saturation Voltage: $V_{CE\ (sat)}$ = 1.80V @ I_C = 80A , T_C=25℃
- 100% RBSOA Tested (2×Ic)
- Low Stray Inductance
- Mixed voltage component topology
- AlN with DBC ceramic base plate
- Lead Free, Compliant With RoHS Requirement



Applications:

- Solar inverter
- UPS



Internal Circuit Diagram

Absolute maximum rated values

Half bridge IGBT（T_C = 25℃ unless otherwise specified）

Symbol	Description		Value	Units
V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C = 80℃	80	A
		T_C = 25℃	160	A
$I_{CM(1)}$	Peak Collector Current Repetitive	T_J = 175℃	160	A
P_D	Maximum Power Dissipation (IGBT)	T_C = 25℃ T_{Jmax}=175℃	1710	W
T_J	Maximum Junction Temperature		175	℃

Half bridge FRD（T_C = 25℃ unless otherwise specified）

Symbol	Description		Value	Units
V_{RRM}	Repetitive Peak Reverse Voltage		1200	V
I_F	DC Forward Current		40	A
I_{FRM}	Repetitive Peak Forward Current		80	A
P_{tot}	Power dissipation per Diode	T_C = 25℃ T_{Jmax}=150℃	780	W
T_J	Maximum Junction Temperature		150	℃

Neutral point IGBT（T_C = 25℃ unless otherwise specified）

Symbol	Description		Value	Units
V_{CES}	Collector-Emitter Blocking Voltage		650	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C = 80℃	75	A
		T_C = 25℃	140	A
$I_{CM(1)}$	Peak Collector Current Repetitive	T_J = 175℃	150	A
t_{SC}	Short Circuit Withstand Time	T_J = 150℃	>5	μs
P_D	Maximum Power Dissipation (IGBT)	T_C = 25℃ T_{Jmax}=175℃	1120	W
T_J	Maximum Junction Temperature		175	℃

Half bridge FRD（T_C = 25℃ unless otherwise specified）

Symbol	Description		Value	Units
V_{RRM}	Repetitive Peak Reverse Voltage		650	V
I_F	DC Forward Current		50	A
I_{FRM}	Repetitive Peak Forward Current		100	A
P_{tot}	Power dissipation per Diode	T_C = 25℃ T_{Jmax}=150℃	410	W
T_J	Maximum Junction Temperature		150	℃

Electrical Characteristics

Half bridge IGBT（T_J = 25℃ unless otherwise specified）

Symbol	Description	Test Conditions		Min.	Typ.	Max.	Units
I_{CES}	Collector-Emitter Leakage Current	V_{GE} = 0V, V_{CE} = V_{CES}	T_J = 25℃			1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = V_{GES}, V_{CE} = 0V	T_J = 25℃			100	nA
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C = 1 mA, V_{CE} = V_{GE}		4.0	4.5	5.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 80`A , V_{GE} = 15V	T_J = 25℃		1.80	2.00	V
			T_J = 150℃		2.00	2.20	V
C_{ies}	Input Capacitance	V_{CE} = 25V, V_{GE} = 0V , f ＝1MHz			7.00		nF
C_{oes}	Output Capacitance				0.44		nF
$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 600V, I_C = 80A , R_G = 10 Ω, V_{GE} =±15V , Inductive Load, T_J = 25℃			340		ns
t_r	Rise Time				70		ns
$t_{d(off)}$	Turn-off Delay Time				330		ns
t_f	Fall Time				160		ns
E_{on}	Turn-on Switching Loss				2.40		mJ
E_{off}	Turn-off Switching Loss				3.46		mJ
E_{ts}	Total Switching Loss				5.86		mJ
$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 600V, I_C = 80A, R_G = 10 Ω, V_{GE} =±15V,			345		ns
t_r	Rise Time				70		ns

$t_{d(off)}$	Turn-off Delay Time	Inductive Load, T_J= 125℃		350		ns
t_f	Fall Time			220		ns
E_{on}	Turn-on Switching Loss			2.89		mJ
E_{off}	Turn-off Switching Loss			4.79		mJ
E_{ts}	Total Switching Loss			7.68		mJ
Q_g	Internal Gate Resistor	V_{CE} = 600V, I_C = 80A, V_{GE} = -15V ~ +15V		855		nC
RBSOA	Reverse Bias Safe Operating Area	I_C = 160A ,V_{CC} = 1050V, Vp =1200V, Rg = 10 Ω, V_{GE}=+15V to 0V, T_J =150°C	Trapezoid			
$R_{\theta JC}$	Junction-To-Case (IGBT part, per Leg)				0.087	℃/W

Half bridge FWD （T_J = 25℃ unless otherwise specified）

Symbol	Description	Test conditions		Min.	Typ.	Max.	Units
V_{FM}	Forward Voltage	I_F＝80A, V_{GE} = 0V	T_J = 25℃		1.90		V
			T_J = 125℃		2.10		
t_{rr}	Reverse Recovery Time	I_F＝80A, di/dt =1100A/μs, V_{rr} = 600V, V_{GE} = -15V	T_J = 25℃		250		ns
			T_J = 125℃		360		
I_{rr}	Peak Reverse Recovery Current		T_J = 25℃		45		A
			T_J = 125℃		55		
Q_{rr}	Reverse Recovery Charge		T_J = 25℃		5.88		μC
			T_J = 125℃		8.63		
E_{rec}	Reverse Recovery Energy		T_J = 25℃		2.56		mJ
			T_J = 125℃		3.79		
$R_{\theta JC}$	Junction-To-Case (Diode Per Leg)				0.160		℃/W

Neutral point IGBT （T_J = 25℃ unless otherwise specified）

Symbol	Description	Test Conditions		Min.	Typ.	Max.	Units
I_{CES}	Collector-Emitter Leakage Current	V_{GE} = 0V, V_{CE} = V_{CES}	T_J = 25℃			1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = V_{GES}, V_{CE} = 0V	T_J = 25℃			100	nA
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C = 2 mA, V_{CE} = V_{GE}		4.0	5.0	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 75A , V_{GE} = 15V	T_J = 25℃		1.60	1.80	V
			T_J = 125℃		1.90		V
C_{ies}	Input Capacitance	V_{CE} = 25V, V_{GE} = 0V , f ＝MHz			3.60		nF
C_{oes}	Output Capacitance				0.45		nF
$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 300V, I_C = 75A , R_G = 20Ω, V_{GE} =±15V , Inductive Load, T_J = 25℃			100		ns
t_r	Rise Time				90		ns
$t_{d(off)}$	Turn-off Delay Time				240		ns
t_f	Fall Time				90		ns
E_{on}	Turn-on Switching Loss				0.52		mJ
E_{off}	Turn-off Switching Loss				0.90		mJ

E_{ts}	Total Switching Loss			1.42		mJ
$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 300V, I_C = 75A, R_G = 20Ω, V_{GE} =±15V, Inductive Load, T_J= 125℃		100		ns
t_r	Rise Time			90		ns
$t_{d(off)}$	Turn-off Delay Time			250		ns
t_f	Fall Time			110		ns
E_{on}	Turn-on Switching Loss			0.93		mJ
E_{off}	Turn-off Switching Loss			1.43		mJ
E_{ts}	Total Switching Loss			2.36		mJ
Q_g	Internal Gate Resistor	V_{CE} = 300V, I_C = 75A, V_{GE} = -15V ~ +15V		260		nC
RBSOA	Reverse Bias Safe Operating Area	I_C = 150A ,V_{CC} = 480V, Vp =600V, Rg = 15Ω, V_{GE} =+15V to 0V, T_J =125°C	Trapezoid			
Symbol	**Description**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
SCSOA	Short Circuit Safe Operating Area	V_{CC} = 300V, V_{GE} = 15V, T_J = 150℃	5			μs
$R_{\theta JC}$	Junction-To-Case (IGBT part, per Leg)				0.134	℃/W

Neutral point FRD（T_J = 25℃ unless otherwise specified）

Symbol	Description	Test conditions		Min.	Typ.	Max.	Units
V_{FM}	Forward Voltage	I_F＝75A, V_{GE} = 0V	T_J = 25℃		1.50		V
			T_J = 125℃		1.50		
t_{rr}	Reverse Recovery Time	I_F＝75A, di/dt =1025A/μs, V_{rr} = 300V, V_{GE} = -15V	T_J = 25℃		115		ns
			T_J = 125℃		160		
I_{rr}	Peak Reverse Recovery Current		T_J = 25℃		40		A
			T_J = 125℃		50		
Q_{rr}	Reverse Recovery Charge		T_J = 25℃		2.92		μC
			T_J = 125℃		4.7		
E_{rec}	Reverse Recovery Energy		T_J = 25℃		0.38		mJ
			T_J = 125℃		0.96		
$R_{\theta JC}$	Junction-To-Case (Diode Part, per Leg)				0.302		℃/W

Internal NTC Thermistor Characteristic

R_{25}	T_C =25℃	22.7		kΩ
△R/R	T_C =100℃， R_{100} =1481 KΩ		±3	%
P_{25}	T_C =25℃	200		mW
$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$	3950		K
$B_{25/80}$	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))]$	4000		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	℃
T_{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T_{stg}	Storage Temperature		-40		+125	℃
$R_{\theta CS}$	Case-To-Sink (Conductive Grease Applied)			0.1		℃/W
T	Mounting Screw:M4		1.0		1.5	N·m
G	Weight			25		g

Half bridge IGBT and half bridge FRD

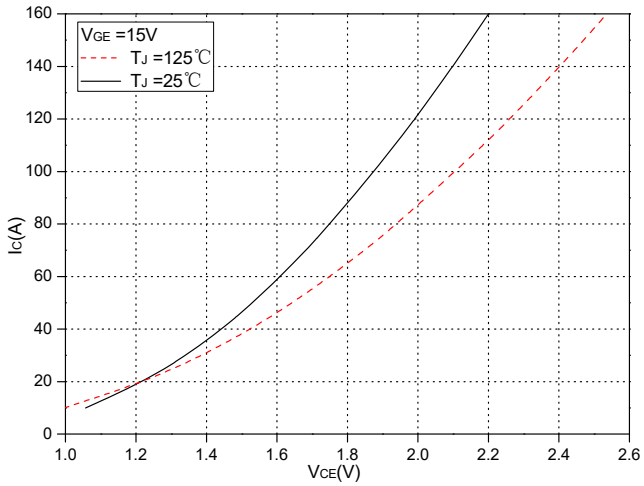


Fig.1 Typical Saturation Voltage Characteristics

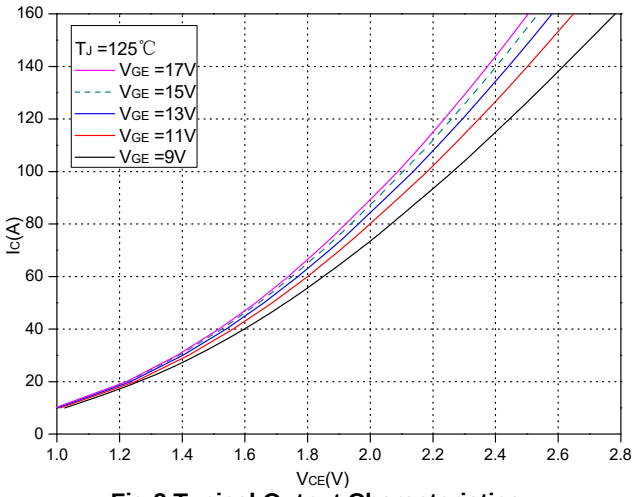


Fig.2 Typical Output Characteristics

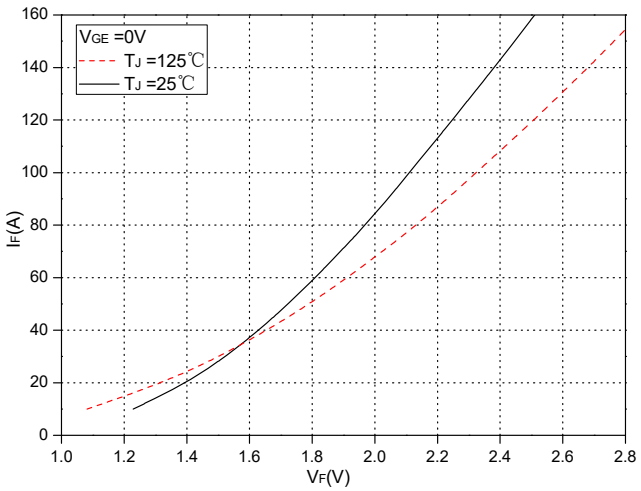


Fig.3 Forward Characteristics of FWD

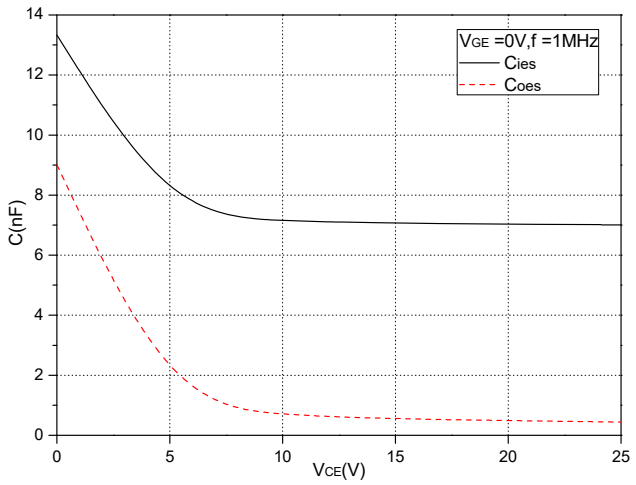


Fig.4 Capacitance Characteristics

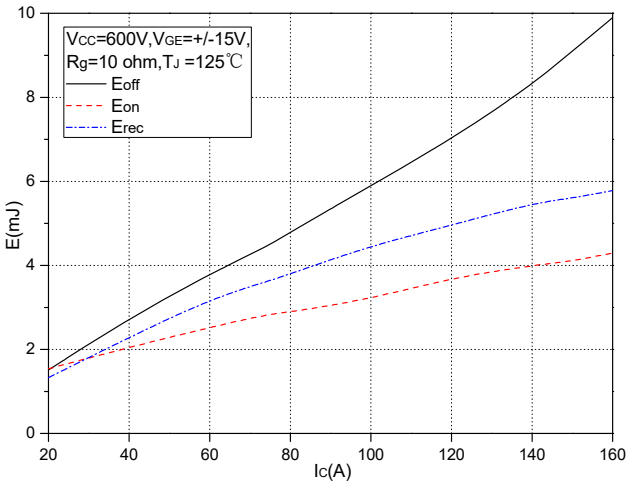


Fig.5 Typical Switching Loss vs. Collector Current

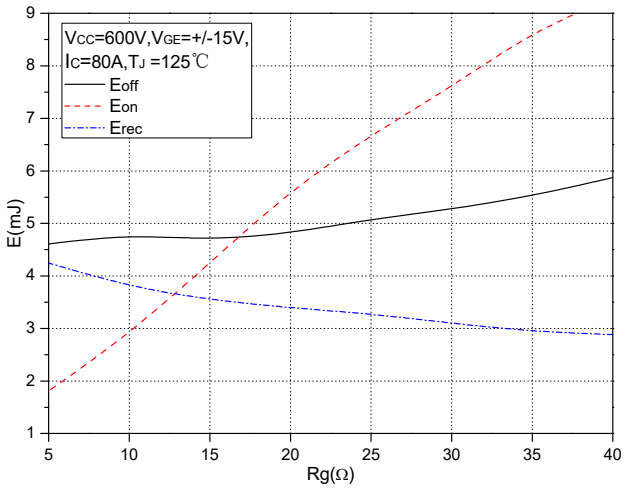


Fig.6 Typical Switching Loss vs. Gate Resistance

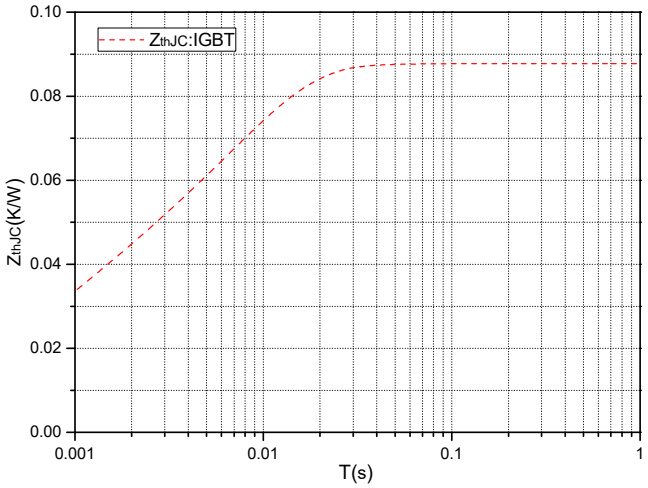


Fig.7 Transient thermal impedance (IGBT)

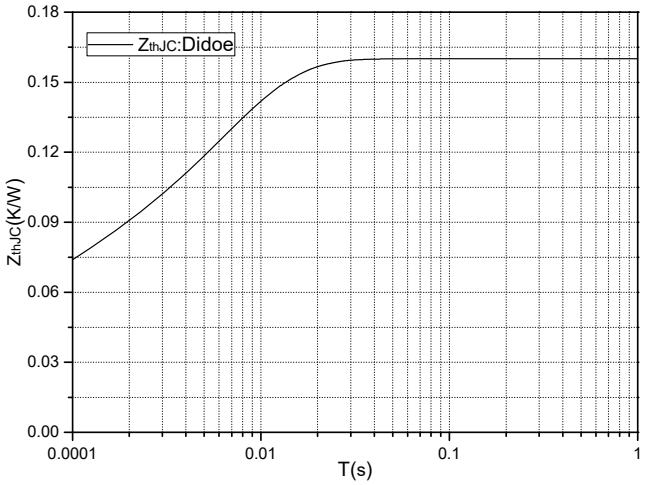


Fig.8 Transient thermal impedance (Diode)

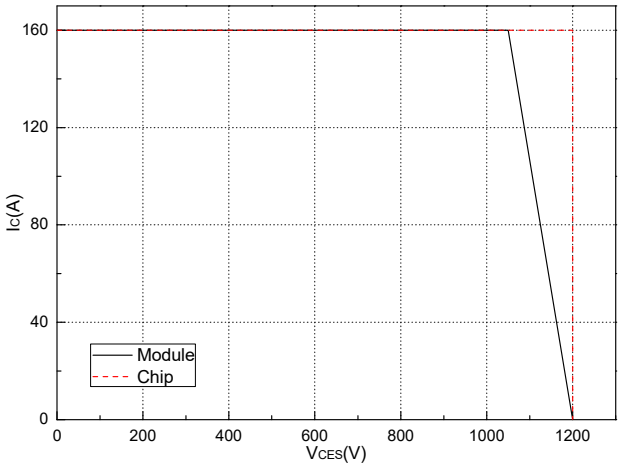


Fig.9 Reverse Bias Safe Operation Area (RBSOA)

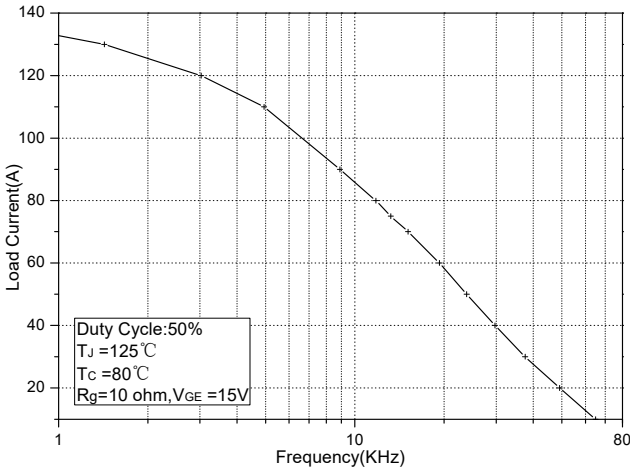


Fig.10 Typical Load Current vs. Frequency

Neutral point IGBT and neutral point FRD：

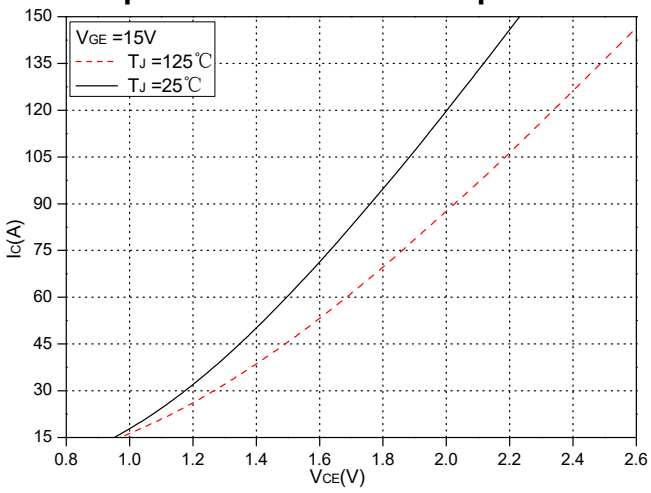


Fig.11 Typical Saturation Voltage Characteristics

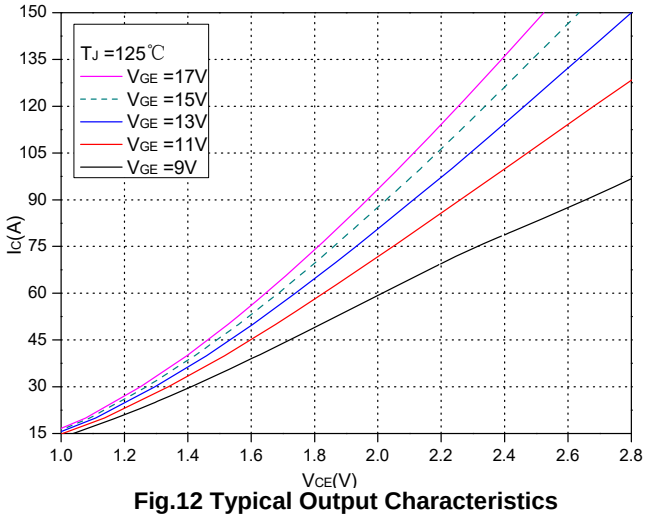


Fig.12 Typical Output Characteristics

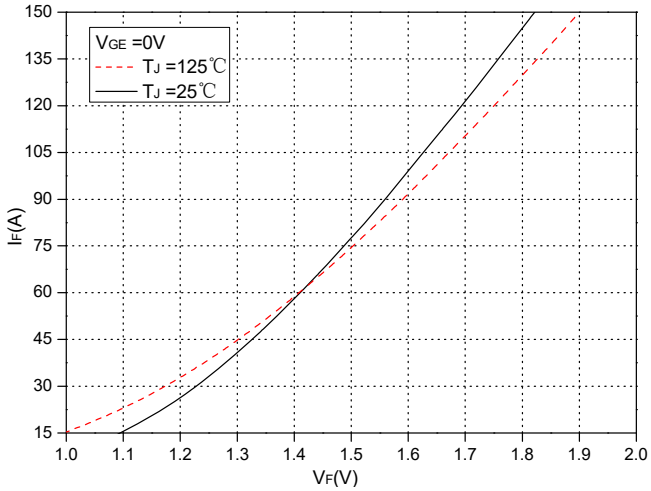


Fig.13 Forward Characteristics of FWD

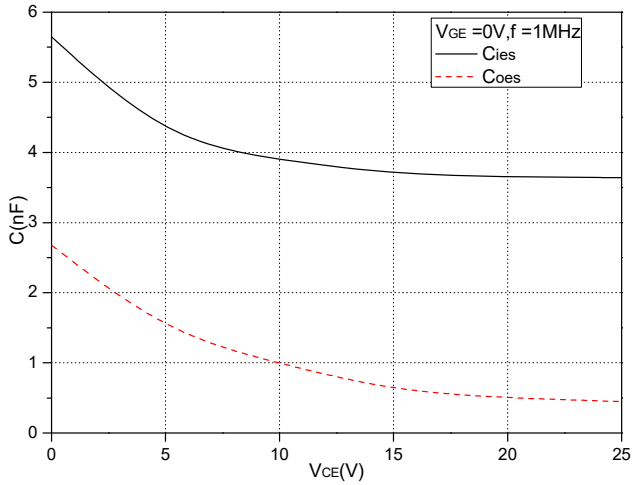
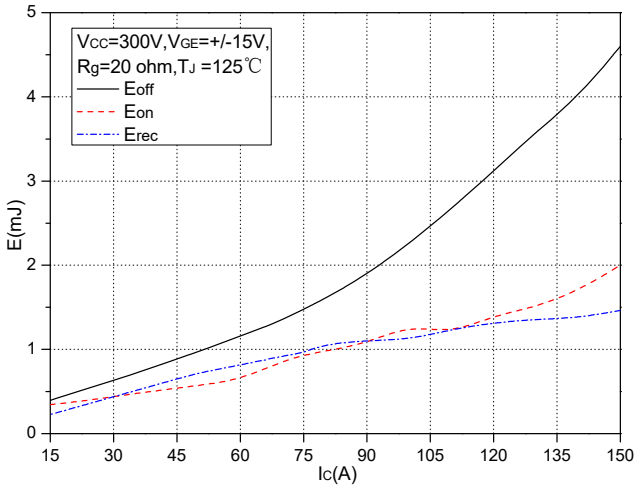


Fig.14 Capacitance Characteristics



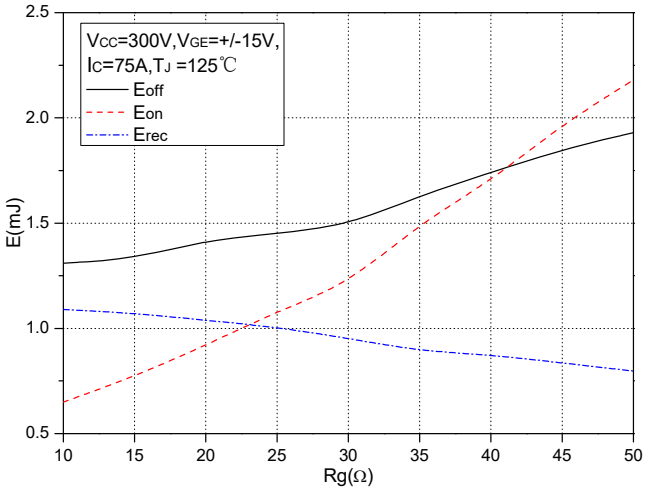


Fig.15 Typical Switching Loss vs. Collector Current

Fig.16 Typical Switching Loss vs. Gate Resistance

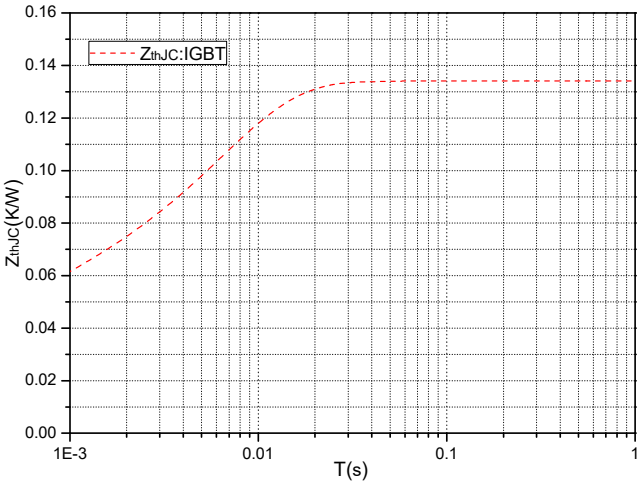


Fig.17 Transient thermal impedance (IGBT)

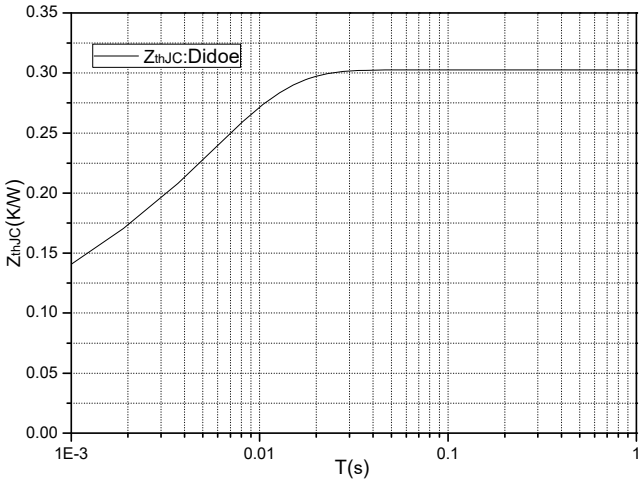


Fig.18 Transient thermal impedance (Diode)

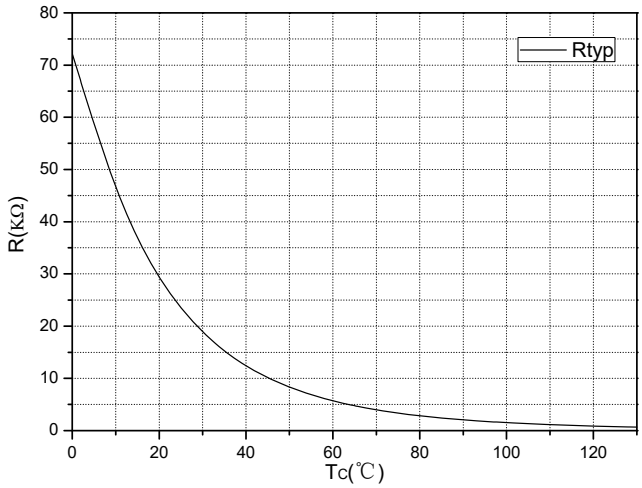


Fig.19 NTC Temperature characteristics

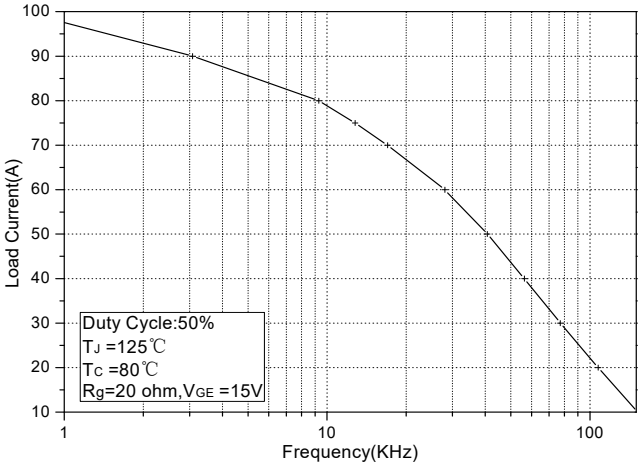
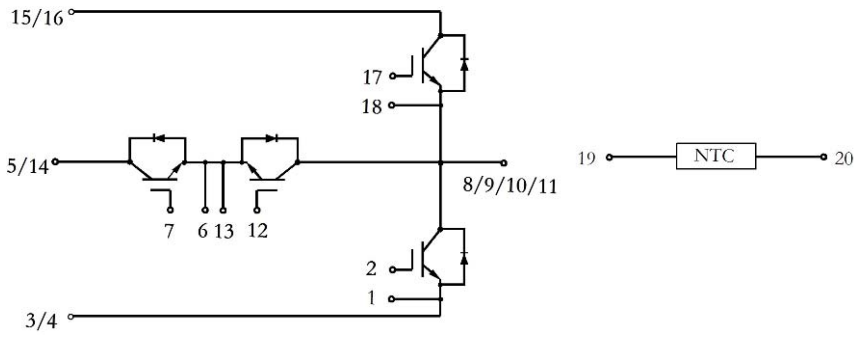
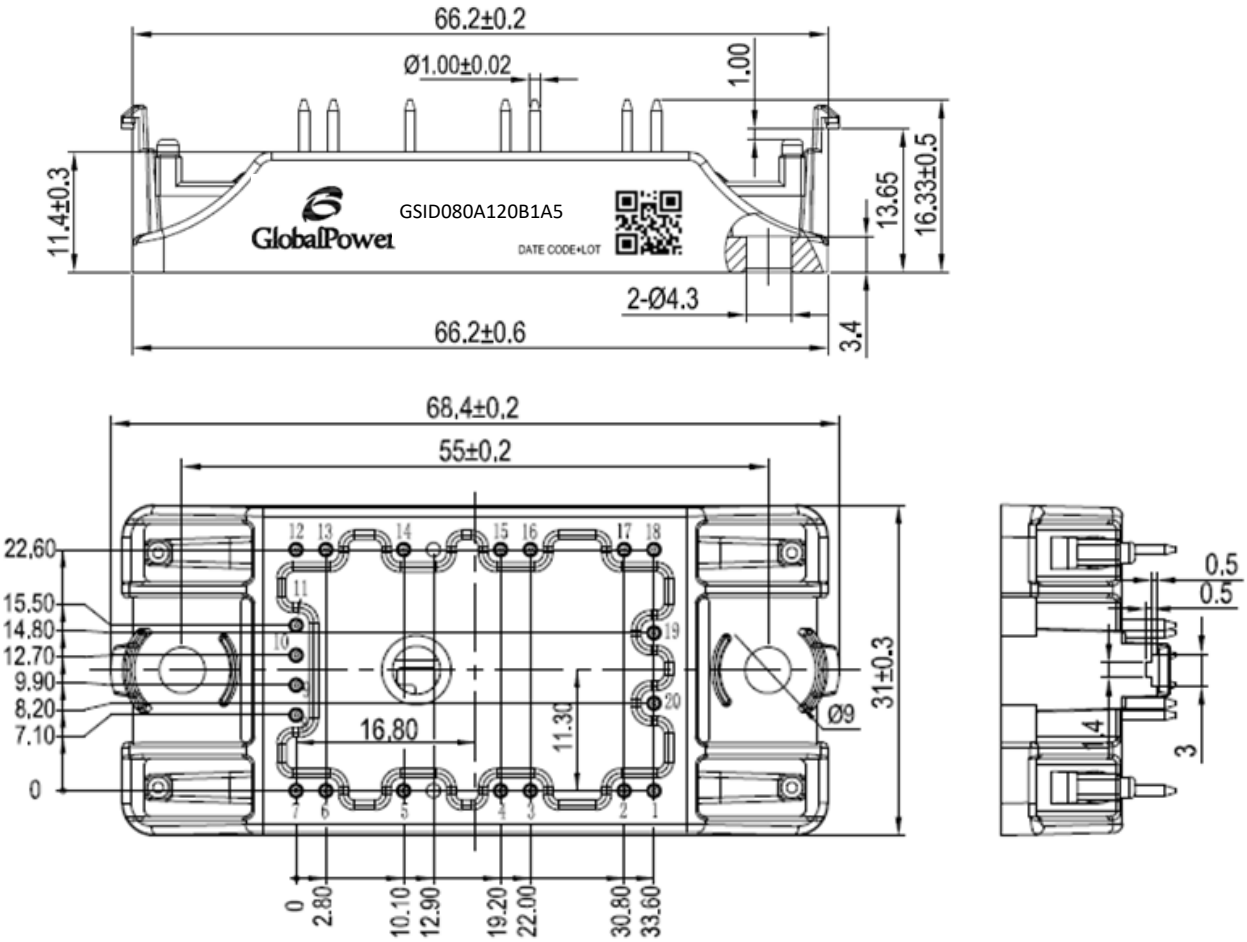


Fig.20 Typical Load Current vs. Frequency

Internal Circuit Diagram:



Package Outline (Unit: mm):



Revision History

Date	Revision	Notes
8/11/2015	0.1	Initial release
05/27/2020	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.

REACh Compliance

REACh substances of high concern (SVHC) information is available for this product. Since the European Chemicals Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future,please contact our office at SemiQ Headquarters in Lake Forest, California to insure you get the most up-to-date REACh SVHC Declaration. REACh banned substance information (REACh Article 67) is also available upon request.

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