



GTR150HF65T1VH

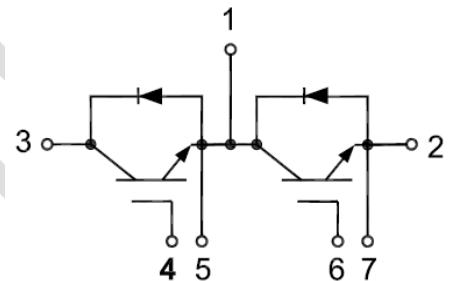
IGBT Module

Features:

- Field Stop Trench Gate IGBT
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested(2xIc)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Applications:

- Welding Machine
- Cutting Machine
- Plating Power Supply
- Induction Heating



IGBT, Inverter

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

V_{CES}	Collector-Emitter Blocking Voltage		650	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C=100^{\circ}\text{C}$	150	A
		$T_C=25^{\circ}\text{C}$	220	A
I_{CM}	Peak Collector Current Repetitive	$T_J=175^{\circ}\text{C}$	300	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^{\circ}\text{C}$ $T_{Jmax}=175^{\circ}\text{C}$	670	W



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	$I_C=1\text{mA}$, $V_{CE}=V_{GE}$	5.0	6.1	6.8	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=150\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.55		V
			$T_J=125^{\circ}\text{C}$	1.70		V
			$T_J=150^{\circ}\text{C}$	1.70		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	$V_{GE}=\pm 20\text{V}$, $V_{CE}=V_{CES}$, $T_J=25^{\circ}\text{C}$			200	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=1\text{MHz}$		12.17		nF
C_{oes}	Output Capacitance			0.56		nF
C_{res}	Reveres Transfer Capacitance			0.40		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=300\text{V}$, $I_C=150\text{A}$, $R_{Gon}=4.7\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^{\circ}\text{C}$	0.21		μs
			$T_J=125^{\circ}\text{C}$	0.21		
			$T_J=150^{\circ}\text{C}$	0.21		
t_r	Rise Time	$V_{CC}=300\text{V}$, $I_C=150\text{A}$, $R_{Gon}=4.7\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^{\circ}\text{C}$	0.10		μs
			$T_J=125^{\circ}\text{C}$	0.10		
			$T_J=150^{\circ}\text{C}$	0.10		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=300\text{V}$, $I_C=150\text{A}$, $R_{Goff}=4.7\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^{\circ}\text{C}$	0.22		μs
			$T_J=125^{\circ}\text{C}$	0.22		
			$T_J=150^{\circ}\text{C}$	0.22		
t_f	Fall Time	$V_{CC}=300\text{V}$, $I_C=150\text{A}$, $R_{Goff}=4.7\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^{\circ}\text{C}$	0.11		μs
			$T_J=125^{\circ}\text{C}$	0.14		
			$T_J=150^{\circ}\text{C}$	0.15		
E_{on}	Turn-on Switching Loss	$V_{CC}=300\text{V}$, $I_C=150\text{A}$, $R_{Gon}=4.7\Omega$, $V_{GE}=\pm 15\text{V}$, $di/dt=1200\text{A}/\mu\text{s}$ ($T_J=150^{\circ}\text{C}$) Inductive Load	$T_J=25^{\circ}\text{C}$	1.22		mJ
			$T_J=125^{\circ}\text{C}$	1.64		
			$T_J=150^{\circ}\text{C}$	1.67		



E _{off}	Turn-off Switching Loss	V _{CC} =300V, I _C =150A, R _{Goff} =4.7Ω, V _{GE} =±15V, dv/dt=3600V/μs (T _J =150°C) Inductive Load	T _J =25°C	2.95	mJ
			T _J =125°C	4.35	
			T _J =150°C	4.65	
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C	0.89	μC
RBSOA	I _C =300A, V _{CC} =600V, V _p =650V, R _{Goff} = 4.7Ω, V _{GE} =+15V to 0V, T _J =150°C			Trapezoid	
SC Data	V _{CC} =300V, t _p =10μs, V _{GE} =±15V, R _{Gon} =10ohm, R _{Goff} =10ohm, T _J =25°C			1012	A
R _{θJC}	IGBT Thermal Resistance: Junction-To-Case			0.225	°C/W

Diode, Inverter

Maximum Rated Values (T_C=25°C unless otherwise specified)

V _{RRM}	Repetitive Peak Reverse Voltage	650	V
I _F	Diode Continuous Forward Current	150	A
I _{FM}	Peak FWD Current Repetitive	300	A

Electrical Characteristics of FWD (T_C=25°C unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
V _{FM}	Forward Voltage	I _F =150A	T _J =25°C	1.60		V
			T _J =125°C	1.70		
			T _J =150°C	1.70		
t _{rr}	Reverse Recovery Time		T _J =25°C	0.10		μs
			T _J =125°C	0.15		
			T _J =150°C	0.16		
I _{rr}	Peak Reverse Recovery Current	I _F =150A, -di _F /dt=1200A/μs (T _J =150°C), V _R =300V, V _{GE} =-15V	T _J =25°C	65.6		A
			T _J =125°C	78.1		
			T _J =150°C	82.8		
Q _{rr}	Reverse Recovery Charge		T _J =25°C	4.07		μC
			T _J =125°C	7.48		
			T _J =150°C	8.77		



E _{rec}	Reverse Recovery Energy	I _F =150A, -di _F /dt=500A/μs(T _J =150°C), V _R =300V, V _{GE} =-15V	T _J =25°C	0.30	mJ
			T _J =125°C	1.42	
			T _J =150°C	1.72	
R _{θJC}	Diode Thermal Resistance: Junction-To-Case			0.367	°C/W

Module

Symbol	Description		Min	Typ	Max	Unit
V _{iso}	Isolation Voltage (All Terminals Shorted)	f = 50Hz, 1minute	2500			V
Material of Module Base plate			Copper			
Internal Isolation			Al ₂ O ₃			
T _J	Maximum Junction Temperature				175	°C
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	°C
T _{stg}	Storage Temperature		-40		+125	°C
CTI	Comparative Tracking Index		200			
R _{θCS}	Case-To-Sink Thermally (Conductive Grease Applied)			0.04		°C/W
T	Power Terminals Screw:M5		3.0		5.0	N·m
T	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			165		g

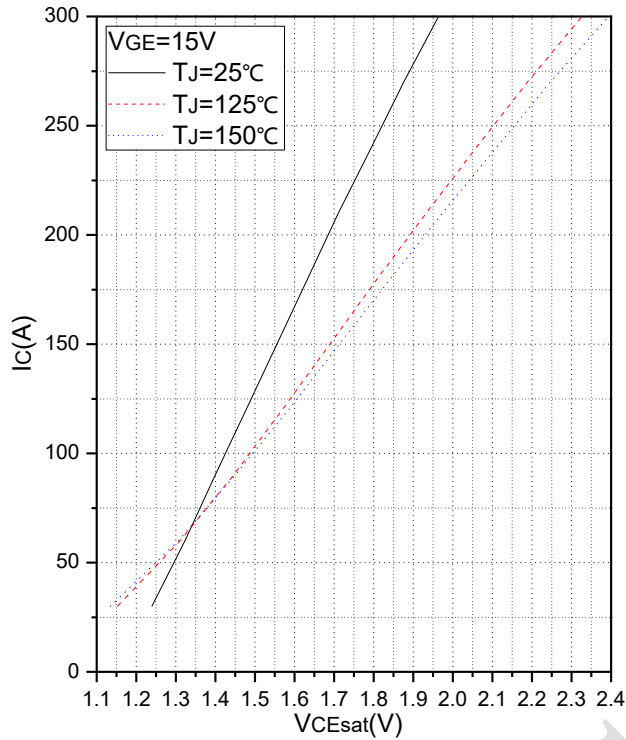


Fig.1 Typical Saturation Voltage Characteristics

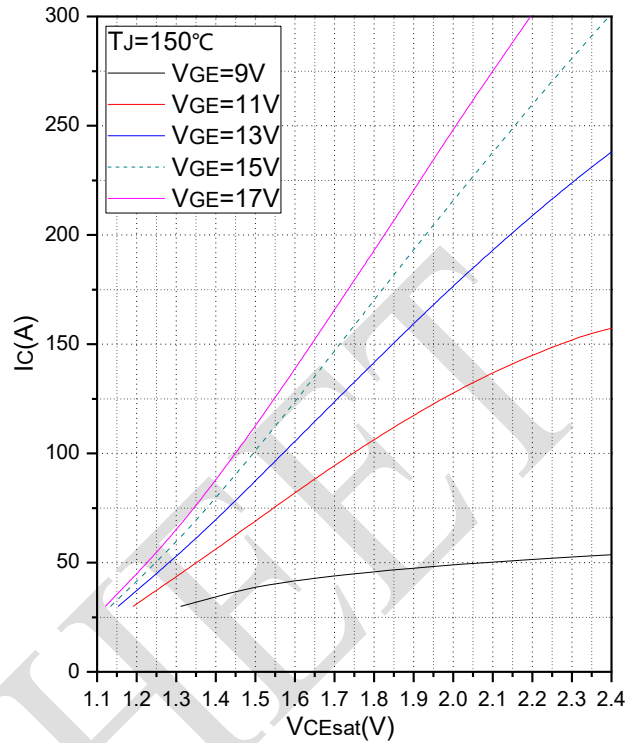


Fig.2 Typical Output Characteristics

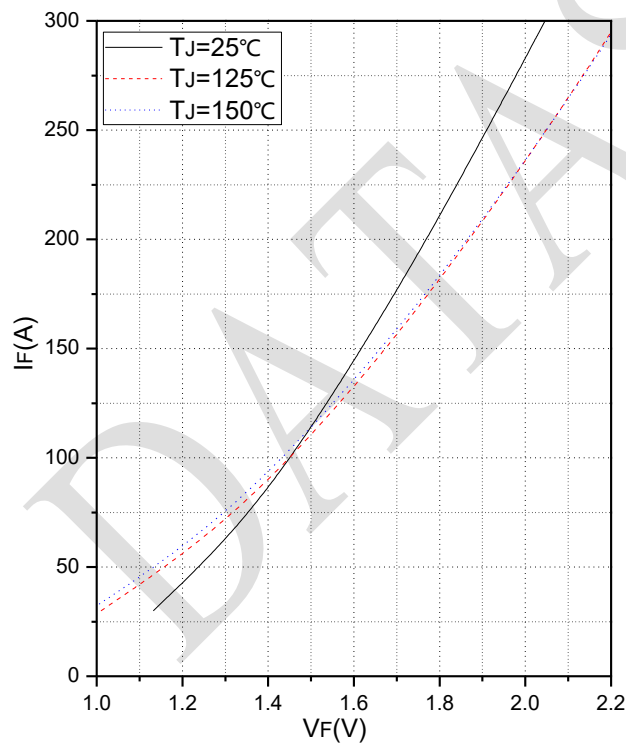


Fig.3 Forward Characteristics of Diode

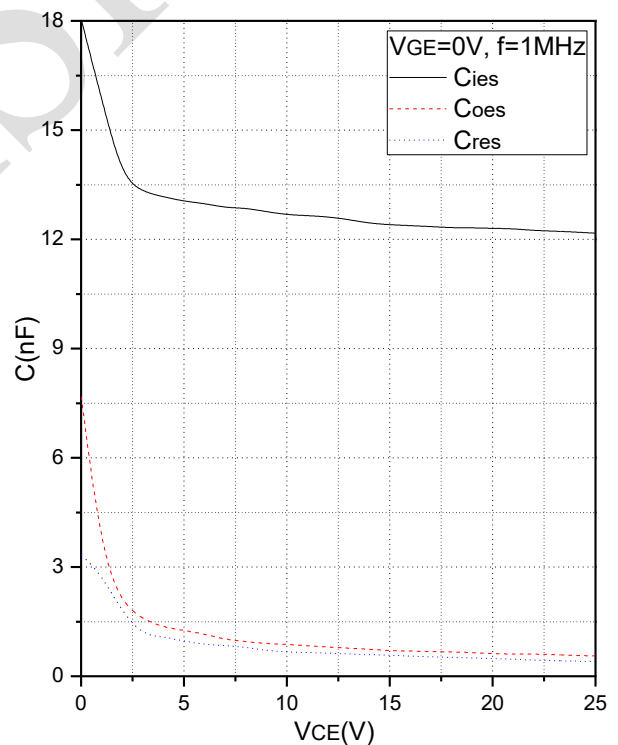


Fig.4 Capacitance Characteristics

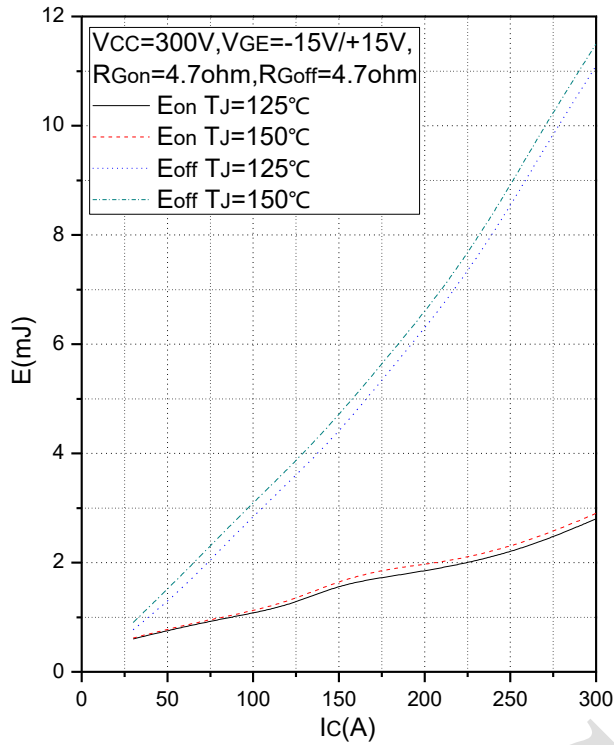


Fig.5 Typical Switching Loss vs. Collector Current

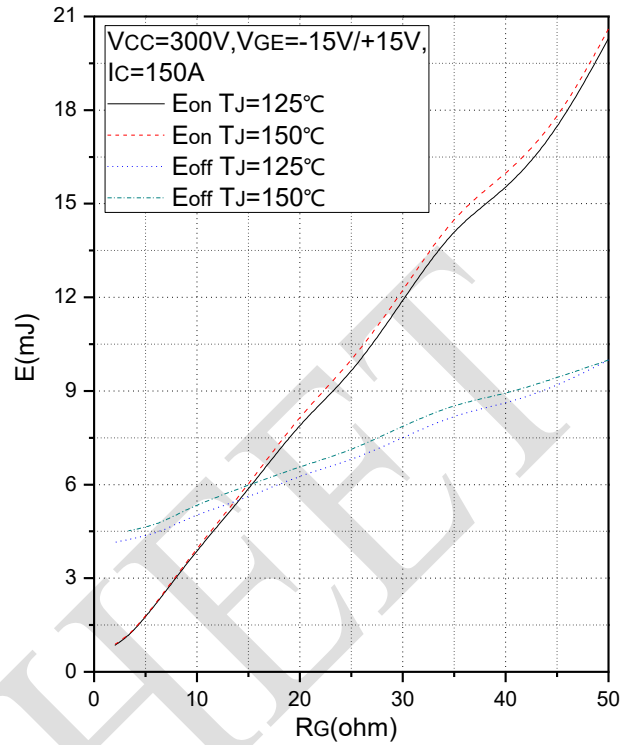


Fig.6 Typical Switching Loss vs. Gate Resistance

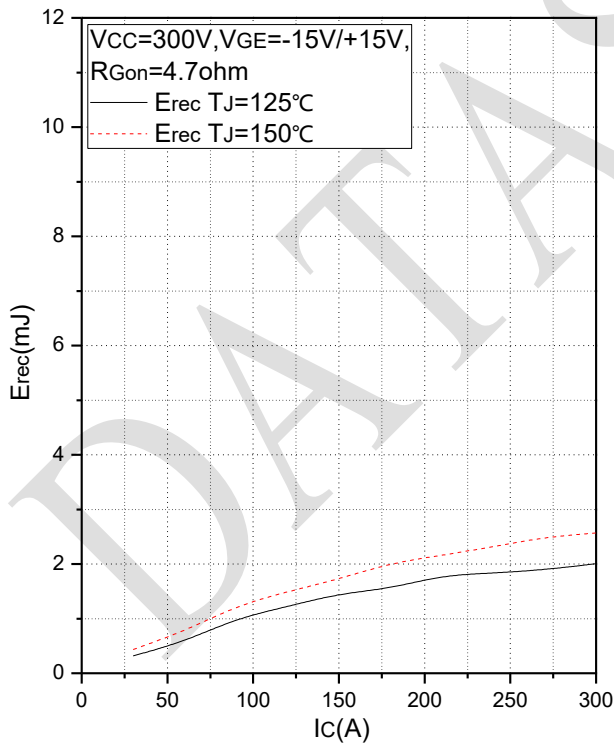


Fig.7 Typical Switching Loss vs. Collector Current

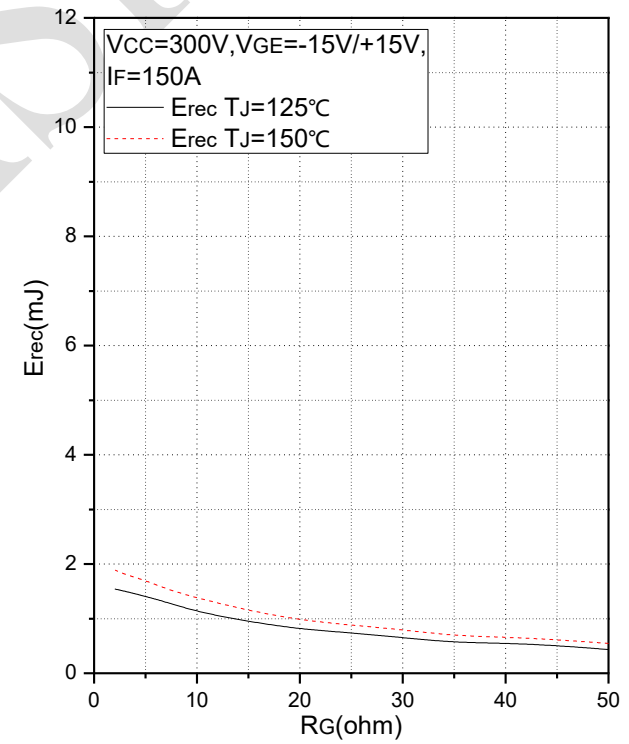


Fig.8 Typical Switching Loss vs. Gate Resistance

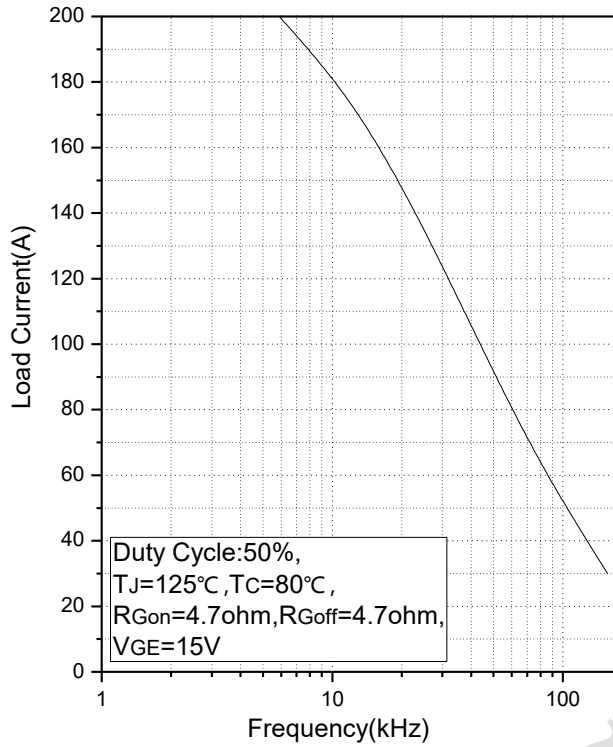


Fig.9 Typical Load Current vs. Frequency

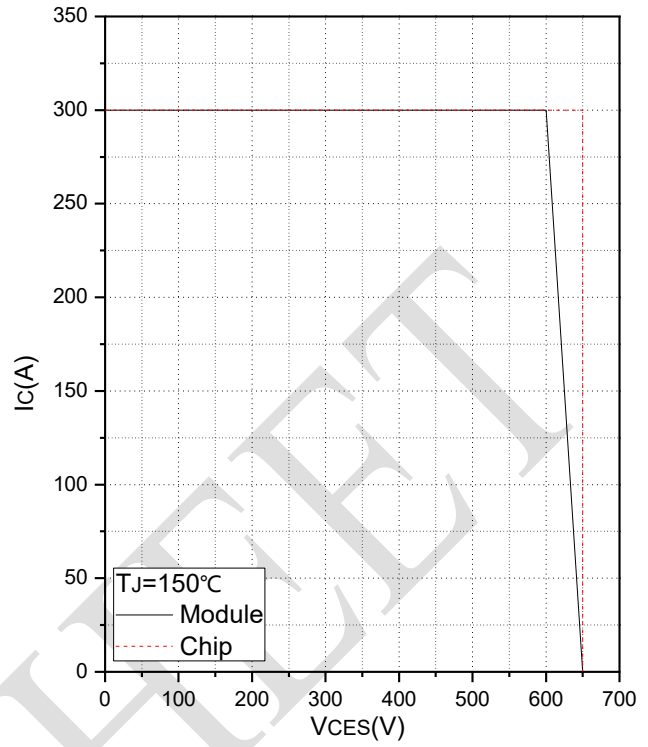


Fig.10 Reverse Bias Safe Operation Area (RBSOA)

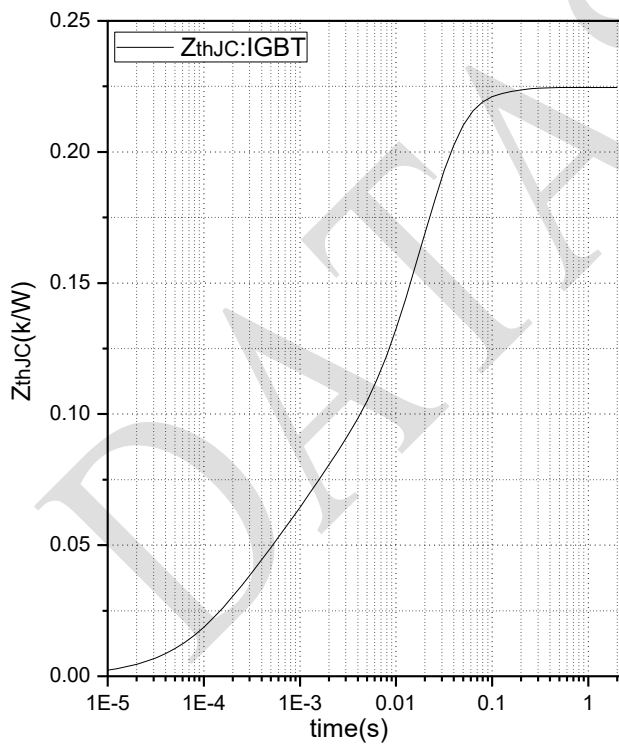


Fig.11 Transient Thermal Impedance (IGBT)

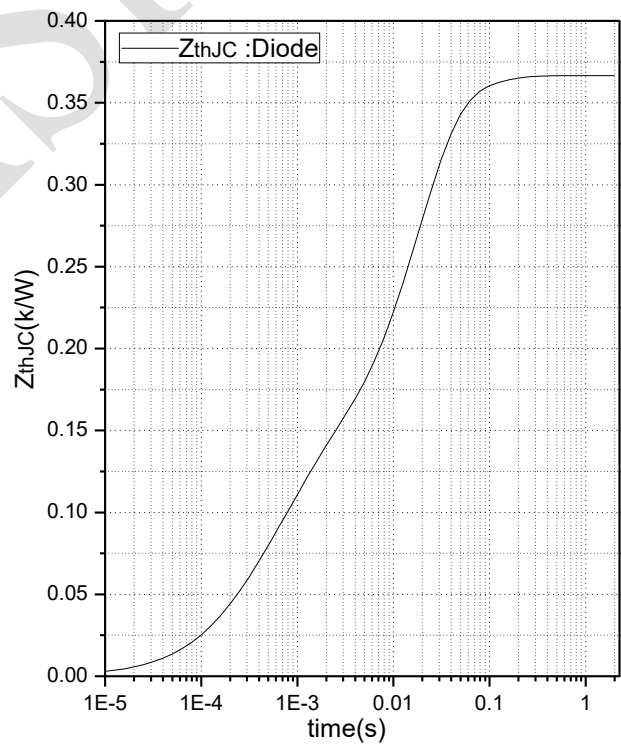


Fig.12 Transient Thermal Impedance (Diode)

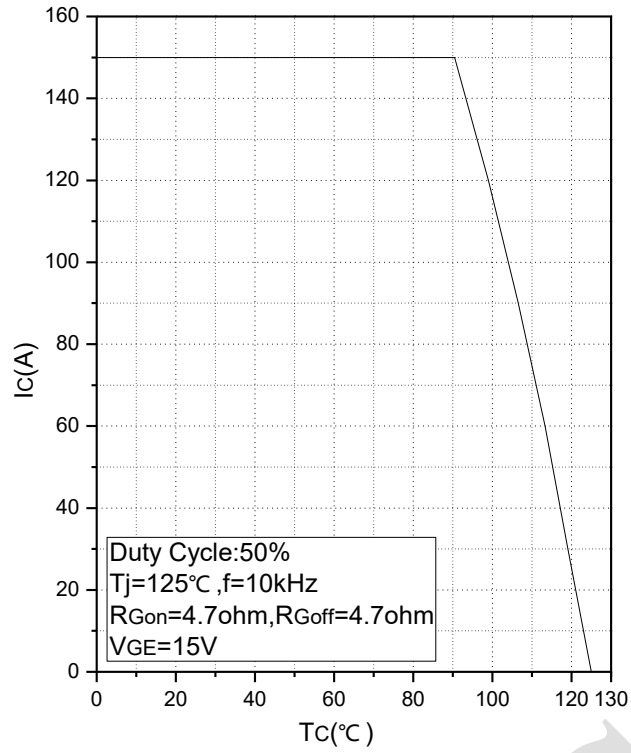
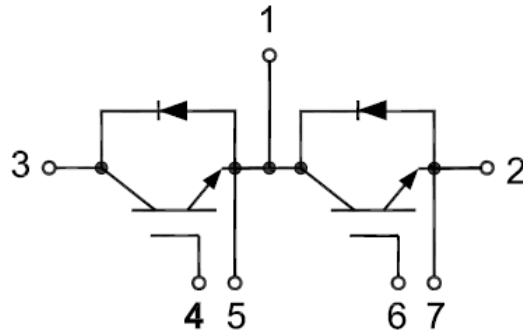


Fig.13 Rated Current vs. Temperature

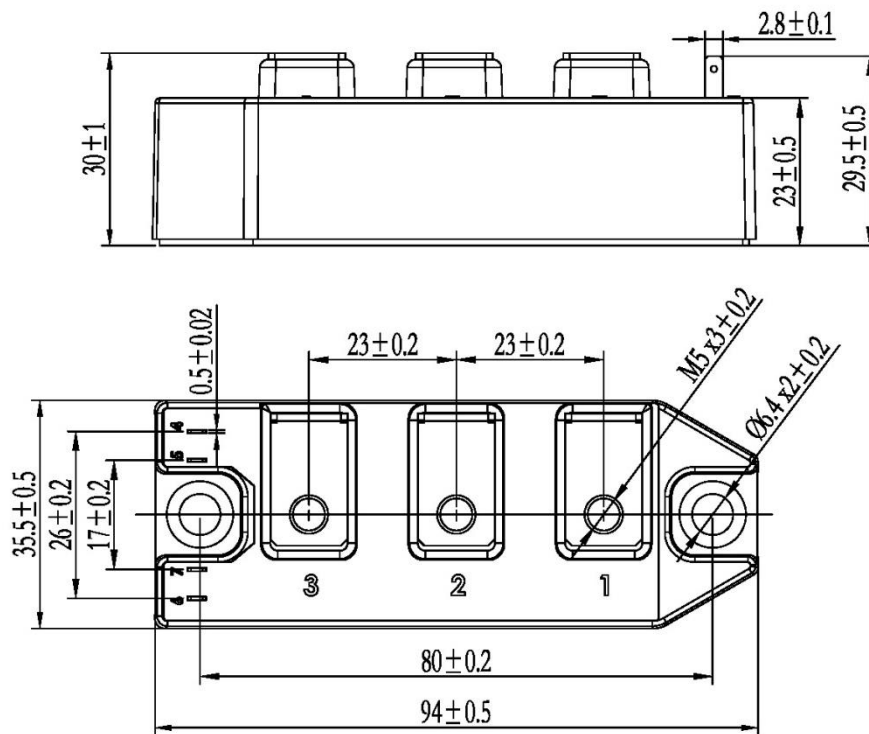
DATA SHEET



Internal Circuit



Package Outline (Unit: mm):





Date	Revision	Notes
08/07/2019	01	Initial Release
03/01/2020	A	Final Version

Announcement

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DATA SHEET