

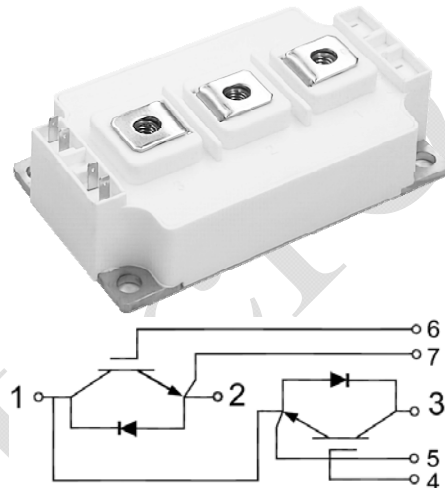
GT450HF120T2NH-M

IGBT Module

Preliminary Data

Features:

- Trench & Field Stop IGBT
- Short Circuit Rated > 10 μ s
- Low Switching Loss
- 100% RBSOA Tested (2 \times I_c)
- Low Stray Inductance
- Copper Wire Bonding on Power Terminal
- Lead Free, Compliant with RoHS Requirement



Applications:

- Welding
- HEV Inverter
- Industrial Motor Drives
- UPS

IGBT, Inverter

Maximum Rated Values (T_C=25°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 =100°C	450	A
		T _C =25°C	870	A
I _{CM}	Peak Collector Current Repetitive	T _J =175°C	900	A
t _{SC}	Short Circuit Withstand Time		>10	μs
P _D	Maximum Power Dissipation (IGBT)	T _C =25°C T _{Jmax} =175°C	2940	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	$I_C=6\text{mA}, V_{CE}=V_{GE}$	5.0	5.5	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=450\text{A}, V_{GE}=15\text{V}$	$T_J=25^\circ\text{C}$	1.70	1.90	V
			$T_J=125^\circ\text{C}$	1.90		V
			$T_J=150^\circ\text{C}$	1.90		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	$V_{GE}=\pm 20\text{V}, V_{CE}=0\text{V}, T_J=25^\circ\text{C}$			800	nA
C_{ies}	Input Capacitance			35.8		nF
C_{oes}	Output Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		2.63		nF
C_{res}	Reverse Transfer Capacitance			1.29		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600\text{V}, I_C=450\text{A}, R_{Gon}=1\Omega, V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	0.45		μs
			$T_J=125^\circ\text{C}$	0.46		
			$T_J=150^\circ\text{C}$	0.47		
t_r	Rise Time		$T_J=25^\circ\text{C}$	0.15		μs
			$T_J=125^\circ\text{C}$	0.15		
			$T_J=150^\circ\text{C}$	0.16		
$t_{d(off)}$	Turn-off Delay Time		$T_J=25^\circ\text{C}$	0.46		μs
			$T_J=125^\circ\text{C}$	0.47		
			$T_J=150^\circ\text{C}$	0.48		
t_f	Fall Time	$T_J=25^\circ\text{C}$	0.12		μs	
		$T_J=125^\circ\text{C}$	0.15			
		$T_J=150^\circ\text{C}$	0.18			
E_{on}	Turn-on Switching Loss	$V_{CC}=600\text{V}, I_C=450\text{A}, R_{Gon}=1\Omega, V_{GE}=\pm 15\text{V},$ $di/dt=2420\text{A}/\mu\text{s} (T_J=150^\circ\text{C})$ Inductive Load	$T_J=25^\circ\text{C}$	16.7		mJ
		$T_J=125^\circ\text{C}$	22.1			
		$T_J=150^\circ\text{C}$	24.8			

E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =450A, R _{Goff} =1Ω, V _{GE} = ±15V, du/dt=3120V/μs (T _J =150°C) Inductive Load	T _J =25°C	44.1	mJ
			T _J =125°C	56.1	
			T _J =150°C	61.1	
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C	2.41	μC
R _{g internal}	Internal Gate Resistance		T _J =25°C	1.67	Ω
RBSOA	I _C =900A, V _{CC} =1050V, V _p =1200V, R _{Goff} =1Ω, V _{GE} =+15V to 0V, T _J =150°C			Trapezoid	
I _{sc}	SC Data	V _{CC} = 600V, V _{GE} = ± 15V, tp=10us R _{G on} =6.8Ω, R _{Goff} = 6.8Ω, T _J = 150°C		2391	A
R _{θJC}	IGBT Thermal Resistance: Junction-To-Case(per leg)			0.051	°C/W

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

V _{RRM}	Repetitive Peak Reverse Voltage	1200	V
I _F	Diode Continuous Forward Current	450	A
I _{FM}	Diode Maximum Forward Current	900	A

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

Symbol	Description	Conditions	Min	Typ	Max	Unit
V _{FM}	Forward Voltage	I _F =450A	T _J =25°C	2.00		V
			T _J =125°C	2.00		
			T _J =150°C	1.90		
t _{rr}	Reverse Recovery Time	I _F =450A, -diF/dt=2680A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C	0.23		μs
			T _J =125°C	0.42		
			T _J =150°C	0.46		
I _{rr}	Peak Reverse Recovery Current	I _F =450A, -diF/dt=2680A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C	234		A
			T _J =125°C	277		
			T _J =150°C	291		

Q _{rr}	Reverse Recovery Charge	I _F =450A, -diF/dt=2680A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		32		μC
			T _J =125°C		57		
			T _J =150°C		67		
E _{rec}	Reverse Recovery Energy		T _J =25°C		15.4		mJ
			T _J =125°C		25.8		
			T _J =150°C		31.1		
R _{θJC}	Diode Thermal Resistance: Junction-To-Case (per leg)				0.086		°C/W

Module

Symbol	Description		Min	Typ	Max	Unit
V _{iso}	Isolation Voltage (All Terminals Shorted)	f =50Hz, 1minute	2500			V
L _{sCE}	Stray Inductance Module			15		nH
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)			0.03		°C/W
M	Power Terminals Screw:M6		3.0		5.0	N·m
M	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			290		g

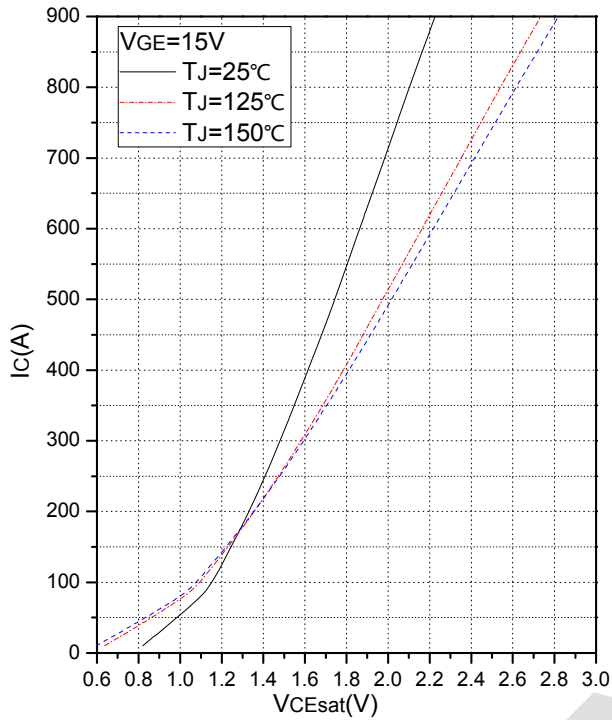


Fig.1 Typical Saturation Voltage Characteristics

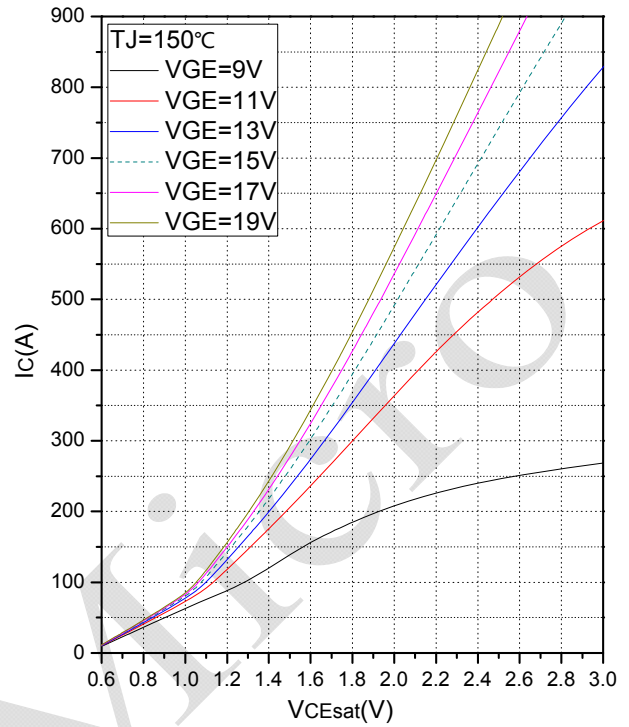


Fig.2 Typical Output Characteristics

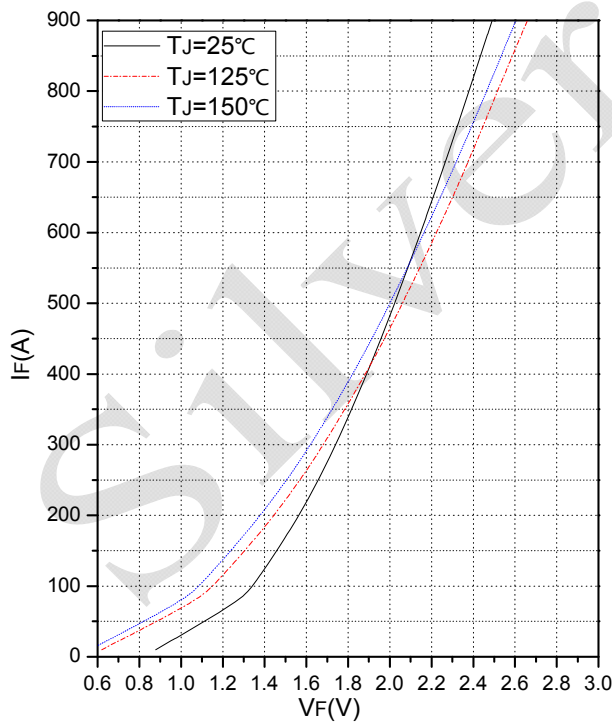


Fig.3 Forward Characteristics of Diode

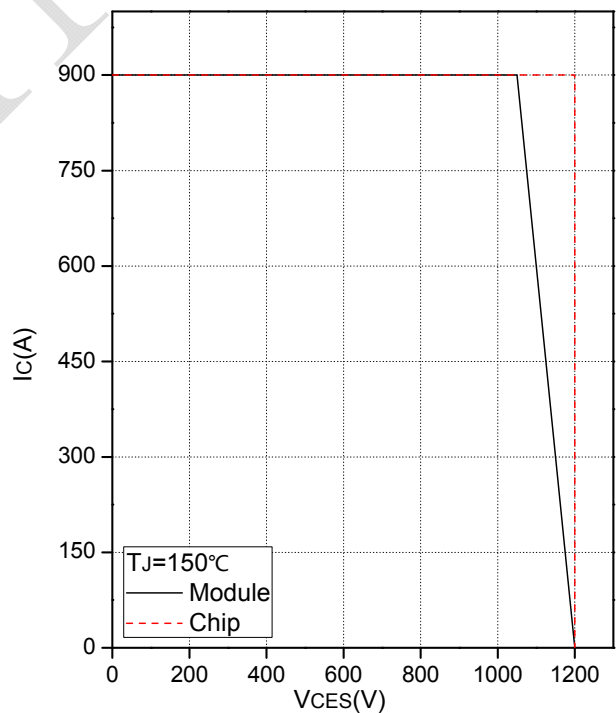


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

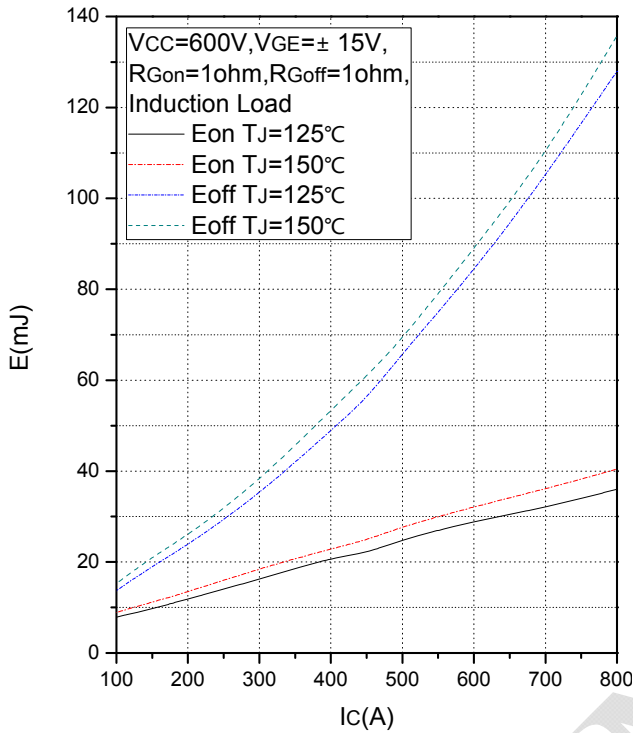


Fig.5 Typical Switching Loss vs. Collector Current

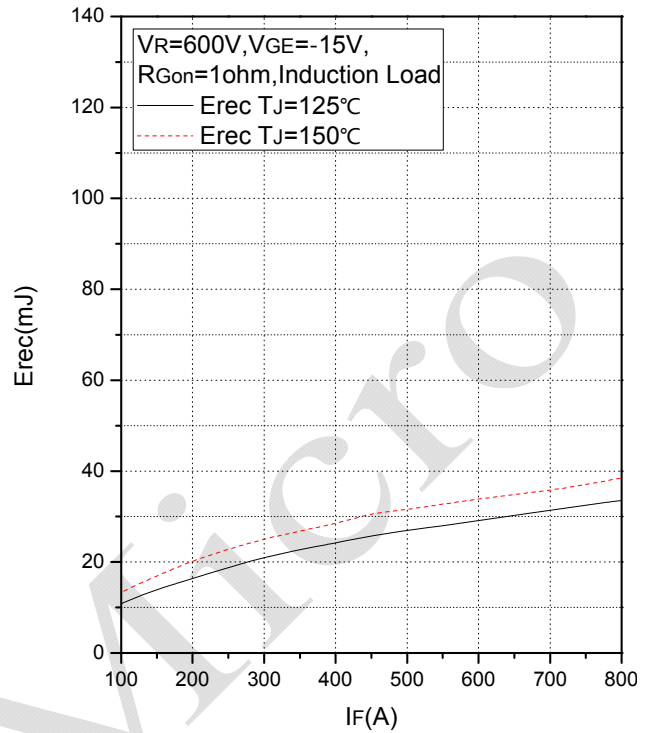


Fig.6 Typical Switching Loss vs. Forward Current

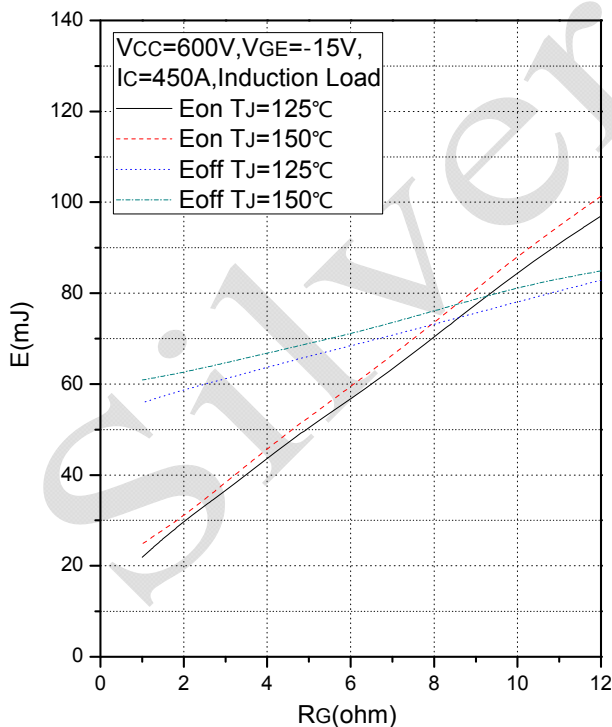


Fig.7 Typical Switching Loss vs. Gate Resistance

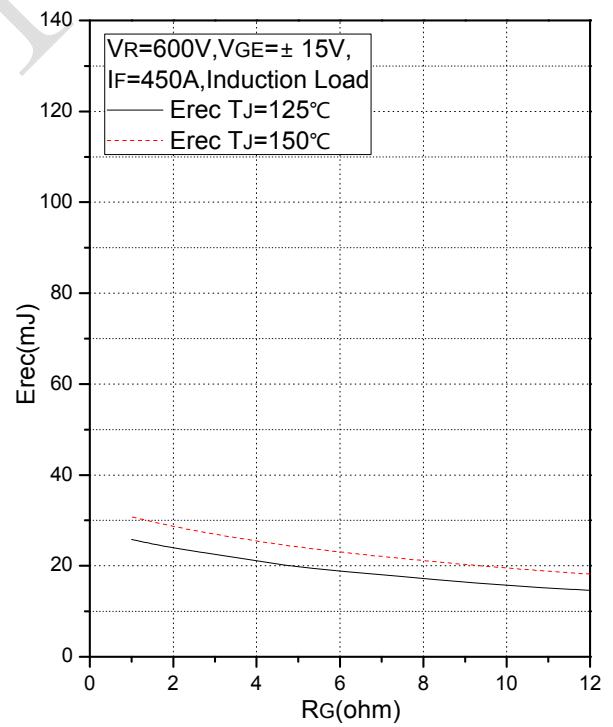
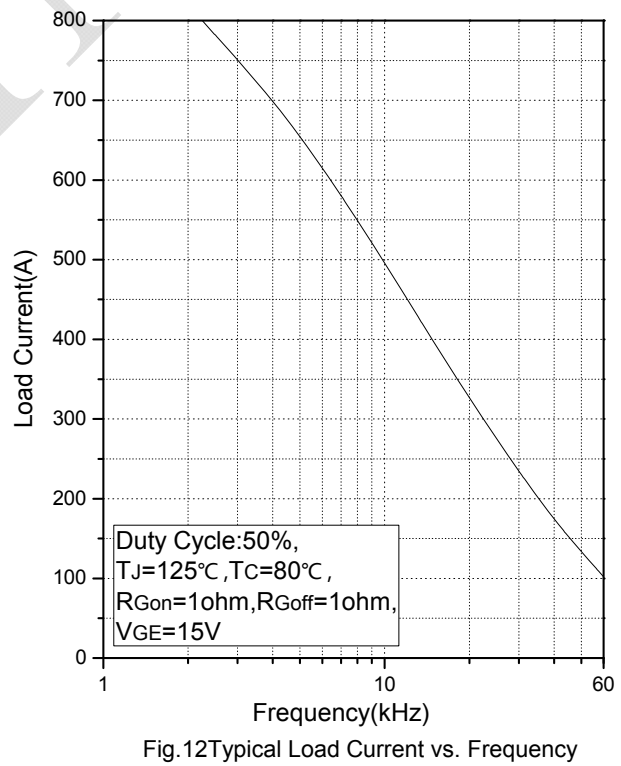
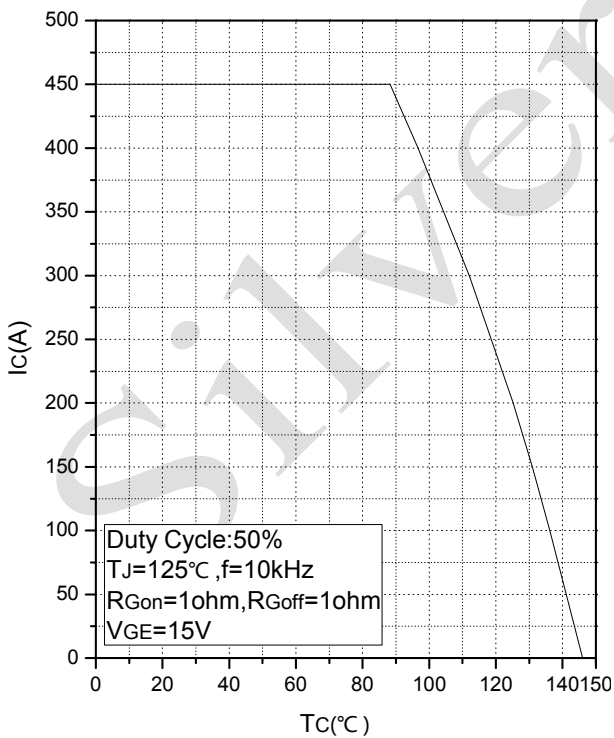
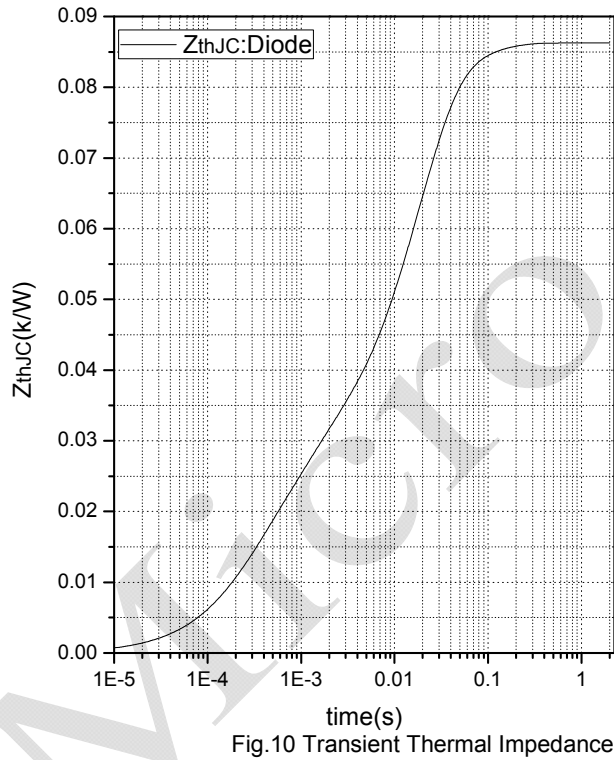
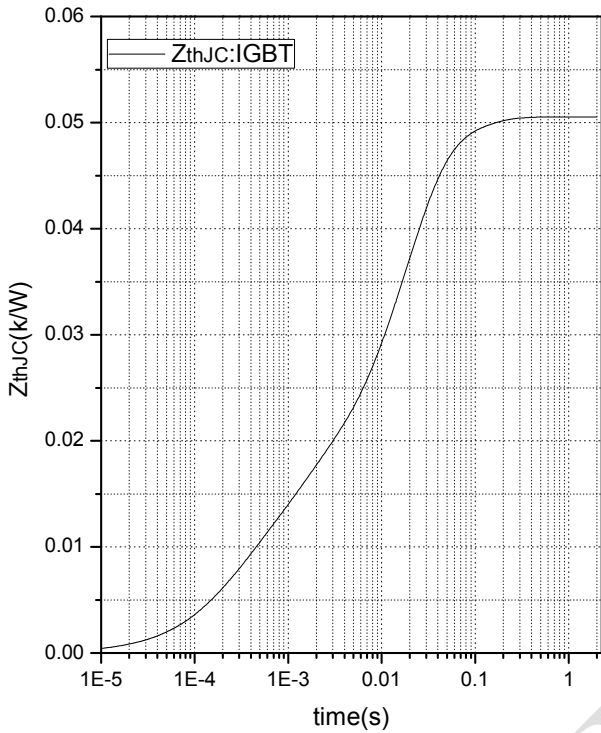


Fig.8 Typical Switching Loss vs. Gate Resistance



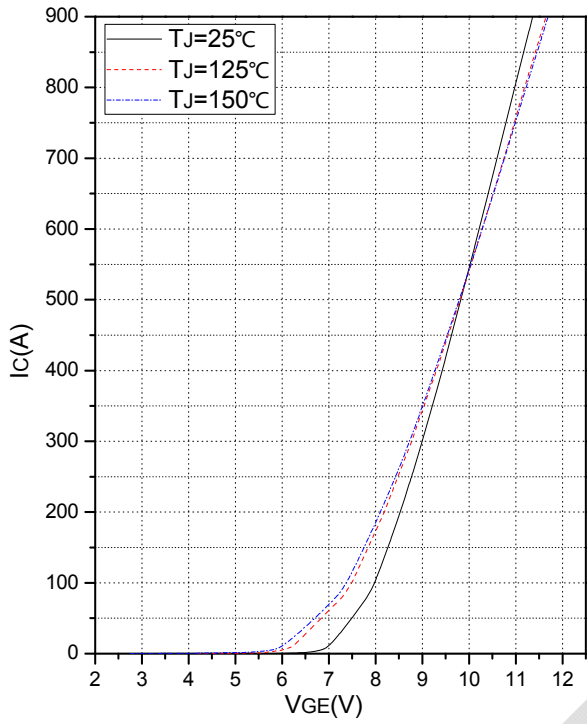


Fig.13 Transfer Characteristics

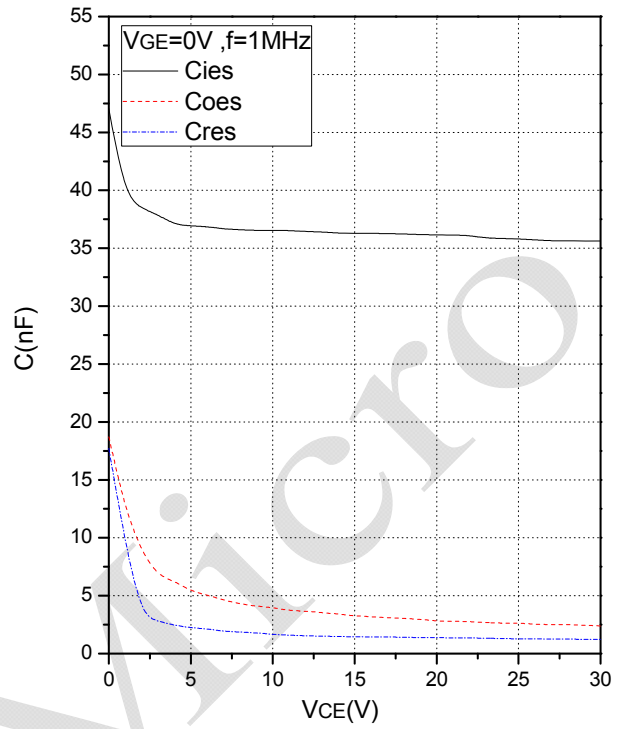
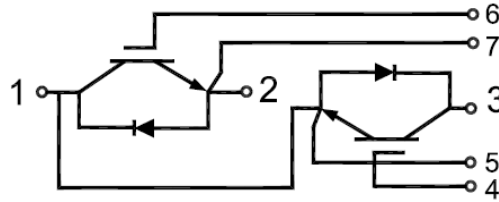
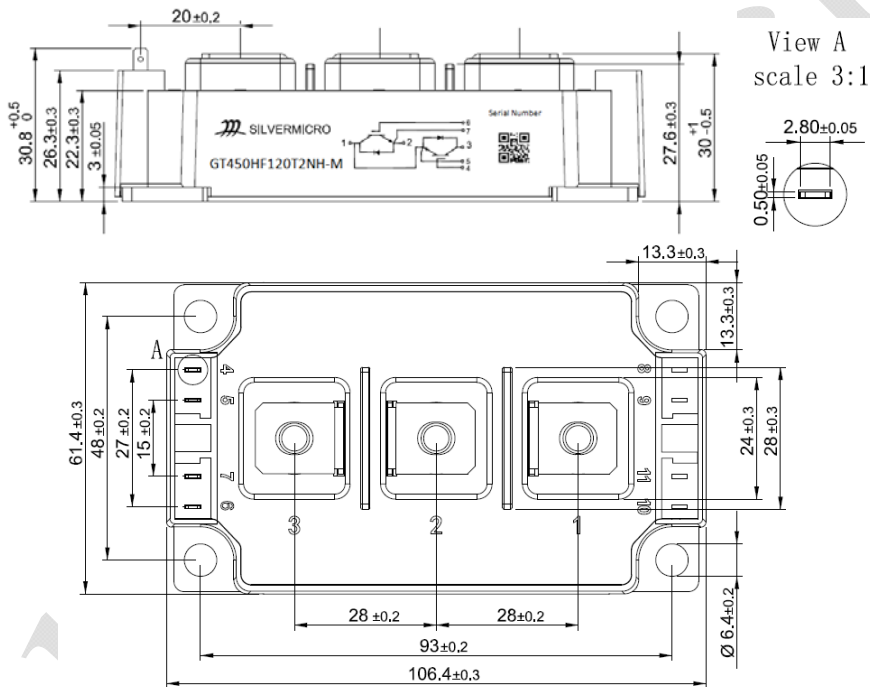


Fig.14 Capacitance Characteristics

Internal Circuit:



Package Outline (Unit: mm):





Date	Revision	Notes
04/13/2018	01	Initial Release
10/29/2018	A	Final Version
03/13/2019	B	Add Transfer Characteristics and Capacitance Characteristics Curve

Announcement

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