



GT300TL65T2SH

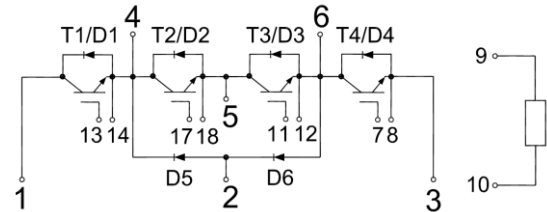
IGBT Module

Preliminary Data

Features:

- Trench & Field Stop IGBT
- Short Circuit Rated $>6\mu\text{s}$
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested($2\times I_c$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Circuit Diagram



Applications:

- Solar Power
- 3-level-application
- UPS Systems

IGBT, T1/T2/T3/T4

Maximum Rated Values

V_{CES}	Collector-Emitter Blocking Voltage		650	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C=100^\circ\text{C}$	300	A
		$T_C=25^\circ\text{C}$	370	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	600	A
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^\circ\text{C}$ $T_J=175^\circ\text{C}$	1113	W



Electrical Characteristics of IGBT

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=4mA, V_{CE}=V_{GE}$	4.0	4.7	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=300A, V_{GE}=15V$	$T_J=25^{\circ}C$	1.50	1.80	V
			$T_J=125^{\circ}C$	1.70		V
			$T_J=150^{\circ}C$	1.75		V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V, V_{CE}=V_{CES}, T_J=25^{\circ}C$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=\pm 20V, V_{CE}=0V, T_J=25^{\circ}C$			± 400	nA
C_{ies}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=100kHz$		18.4		nF
C_{oes}	Output Capacitance			1.44		nF
C_{res}	Reverse Transfer Capacitance			0.55		nF

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =300V, I _C =300A, R _{Gon} =4.7Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		412		ns	
			T _J =125℃		417			
			T _J =150℃		421			
t _r	Rise Time		T _J =25℃		217		ns	
			T _J =125℃		220			
			T _J =150℃		226			
t _{d(off)}	Turn-off Delay Time		V _{CC} =300V, I _C =300A, R _{Goff} =4.7Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		432		ns
				T _J =125℃		436		
				T _J =150℃		438		
t _f	Fall Time	T _J =25℃			118		ns	
		T _J =125℃			129			
		T _J =150℃			130			
E _{on}	Turn-on Switching Loss	V _{CC} =300V, I _C =300A, R _{Gon} =4.7Ω, V _{GE} =±15V, di/dt=1134A/μs (T _J =150℃) Inductive Load		T _J =25℃		8.2		mJ
		T _J =125℃			10.4			
		T _J =150℃			10.8			



E _{off}	Turn-off Switching Loss	V _{CC} =300V, I _C =300A, R _{Goff} =4.7Ω, V _{GE} =±15V, du/dt=2160V/μs (T _J =150°C) Inductive Load	T _J =25°C		12.5		mJ
			T _J =125°C		15.8		
			T _J =150°C		17.2		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		1.47		μC
R _{g internal}	Internal Gate Resistance		T _J =25°C		1		Ω
SCSOA	V _{CC} =300V, V _{GE} =±15V, T _J =150°C			6			μs
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case (per IGBT)					0.13	°C/W

Diode, D1/D2/D3/D4

Maximum Rated Values

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	650	V
I _F	Diode Continuous Forward Current	T _C =100°C	200	A
I _{FM}	Peak FWD Current Repetitive	t _p =1ms	400	A

Electrical Characteristics of Diode

Symbol	Description	Conditions		Min	Typ	Max	Unit
V _{FM}	Forward Voltage	I _F =200A	T _J =25℃		1.60		V
			T _J =125℃		1.70		
			T _J =150℃		1.70		
t _{rr}	Reverse Recovery Time	I _F =200A, -diF/dt=1550A/μs(T _J =150℃), V _R =300V, V _{GE} =-15V	T _J =25℃		120		ns
			T _J =125℃		157		
			T _J =150℃		180		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		75		A
			T _J =125℃		90		
			T _J =150℃		105		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		5.15		μC
			T _J =125℃		9.65		
			T _J =150℃		11.53		



E _{rec}	Reverse Recovery Energy	I _F =200A, -diF/dt=1550A/μs(T _J =150°C), V _R =300V, V _{GE} =-15V	T _J =25°C		0.5		mJ
			T _J =125°C		1.5		
			T _J =150°C		2.3		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per Diode)					0.29	°C/W

Diode, D5/D6

Maximum Rated Values

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	650	V
I _F	Diode Continuous Forward Current	T _C =100°C	300	A
I _{FM}	Peak Diode Current Repetitive	t _p =1ms	600	A

Electrical Characteristics of Diode

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =300A	T _J =25℃		1.58		V
			T _J =125℃		1.65		
			T _J =150℃		1.60		
t _{rr}	Reverse Recovery Time	I _F =300A, -diF/dt=1449A/μs(T _J =150℃), V _R =300V, V _{GE} =-15V	T _J =25℃		125		ns
			T _J =125℃		169		
			T _J =150℃		174		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		80		A
			T _J =125℃		113		
			T _J =150℃		122		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		5.99		μC
			T _J =125℃		11.6		
			T _J =150℃		12.8		
E _{rec}	Reverse Recovery Energy		T _J =25℃		0.6		mJ
			T _J =125℃		2.0		
			T _J =150℃		2.4		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per Diode)					0.18	℃/W



Internal NTC-Thermistor Characteristics

Symbol	Conditions	Min.	Typ.	Max.	Units
R ₂₅	T _C =25℃		5		kΩ
△R/R	T _C =100℃, R ₁₀₀ =465Ω	-5		+5	%
P ₂₅	T _C =25℃			10	mW
B _{25/50}	$R_2=R_{25} \exp[B_{25/50}(1/T_2-1/(298.15K))]$		3380		K
B _{25/80}	$R_2=R_{25} \exp[B_{25/80}(1/T_2-1/(298.15K))]$		3440		K
B _{25/100}	$R_2=R_{25} \exp[B_{25/100}(1/T_2-1/(298.15K))]$		3545		K

Module

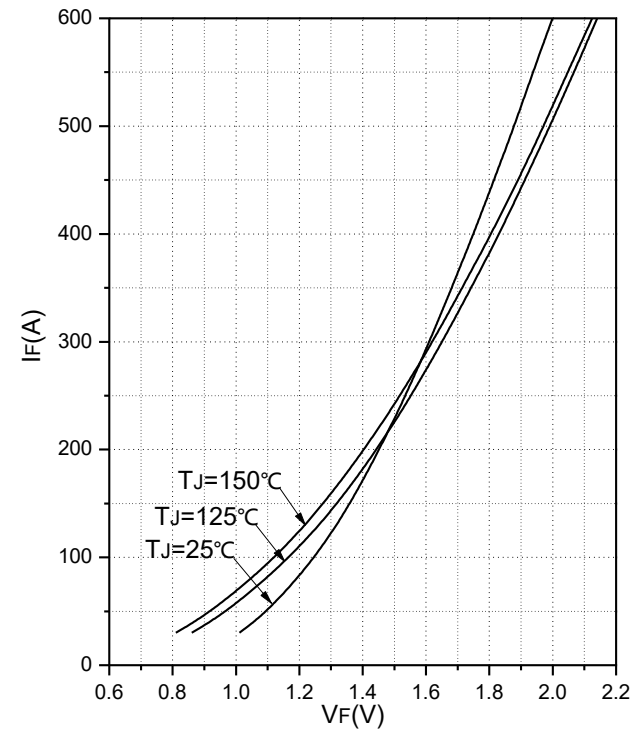
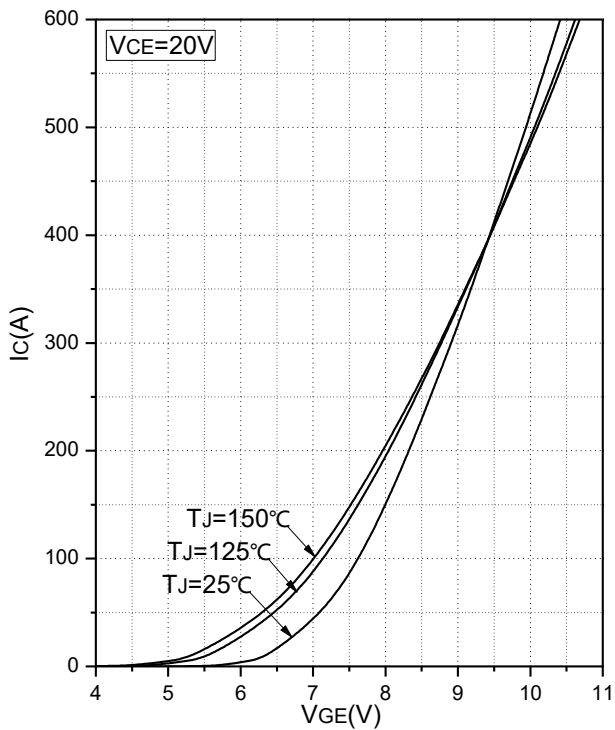
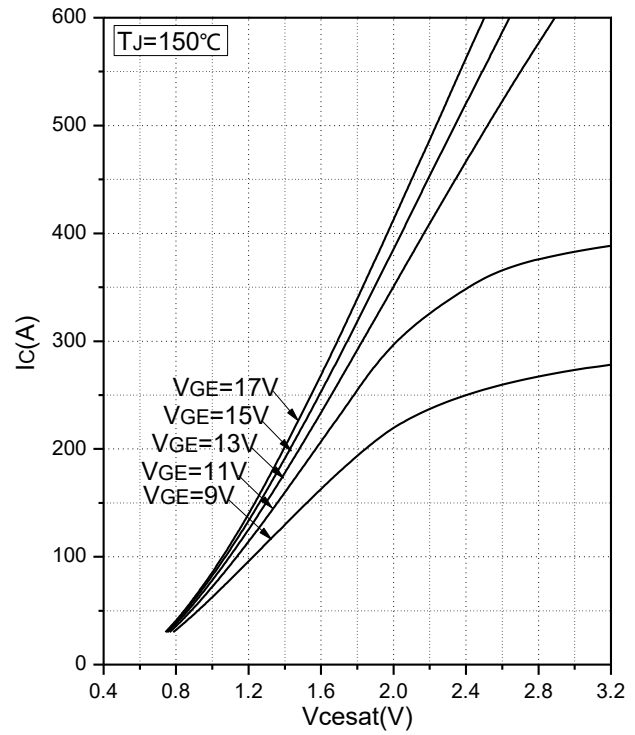
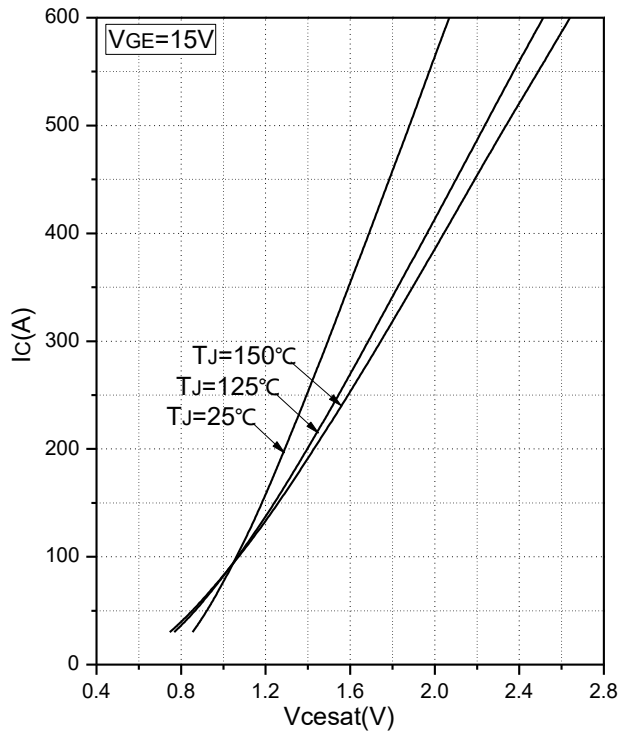
Symbol	Description	Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 1minute 2500			V
T _J	Maximum Junction Temperature			175	℃
T _{JOP}	Maximum Operating Junction Temperature Range	-40		150	℃
T _{stg}	Storage Temperature	-40		125	℃
R _{θCS}	Case-to-Sink Thermally (Conductive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



Ordering Information Table

Device code	G	T	300	TL	65	T2S	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Field Stop Trench Gate IGBT
- ③ - Rated Current (300=300A)
- ④ - Circuit Configuration: TL (Three Level)
- ⑤ - Rated Voltage (65=650V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



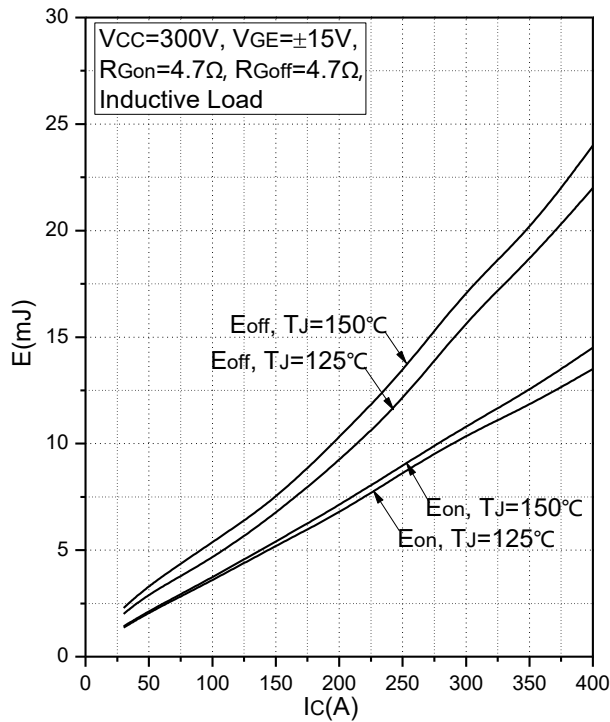


Fig.5 Typical Switching Loss vs. Collector Current
T1/T2/T3/T4

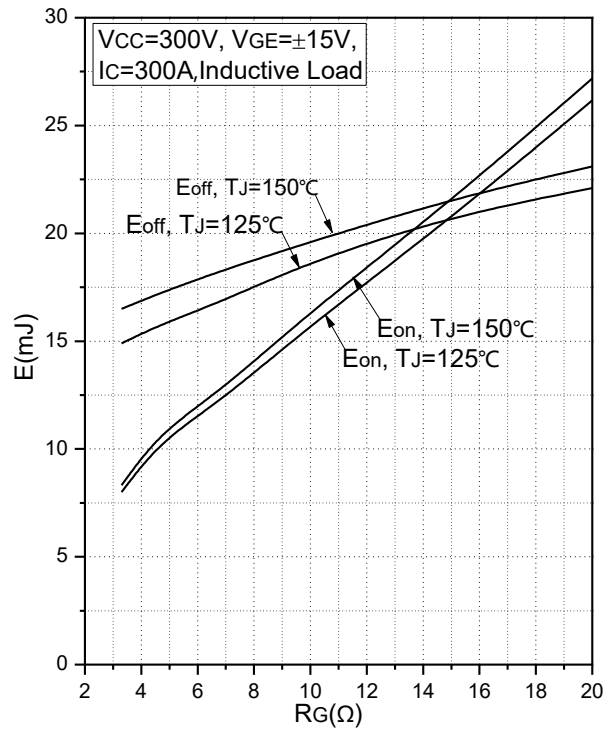


Fig.6 Typical Switching Loss vs. Gate Resistance
T1/T2/T3/T4

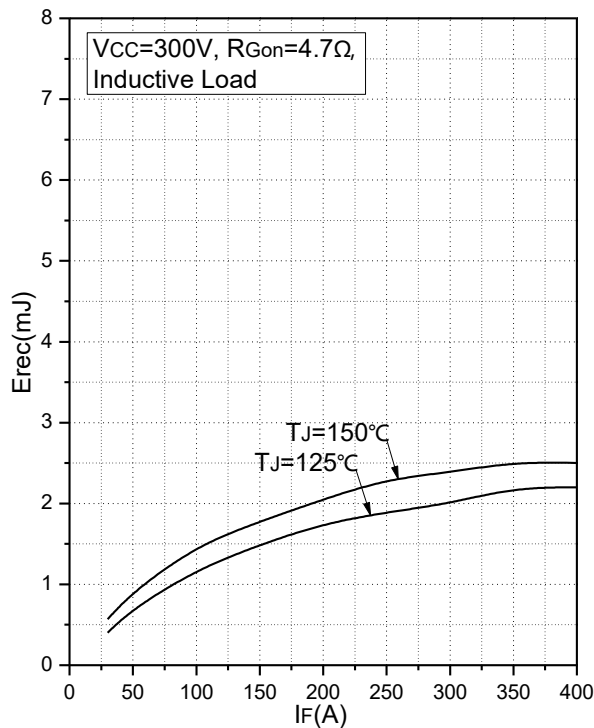


Fig.7 Typical Switching Loss vs. Forward Current
D5/D6

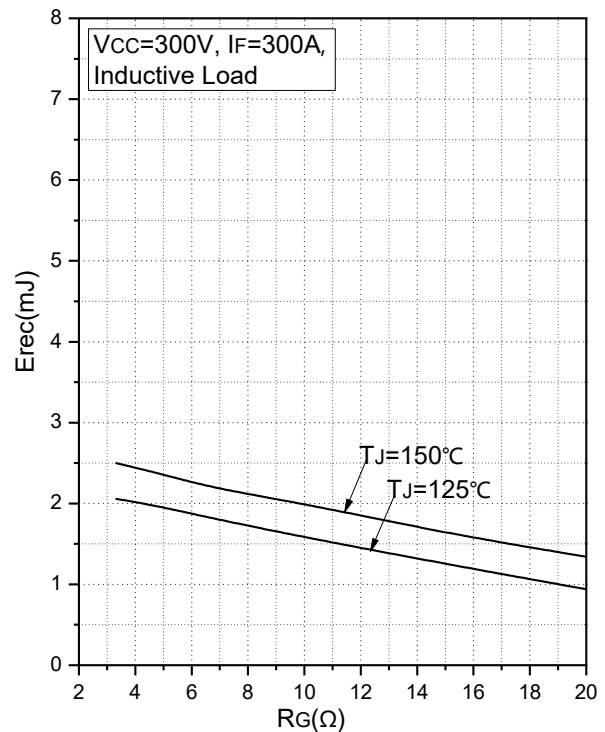
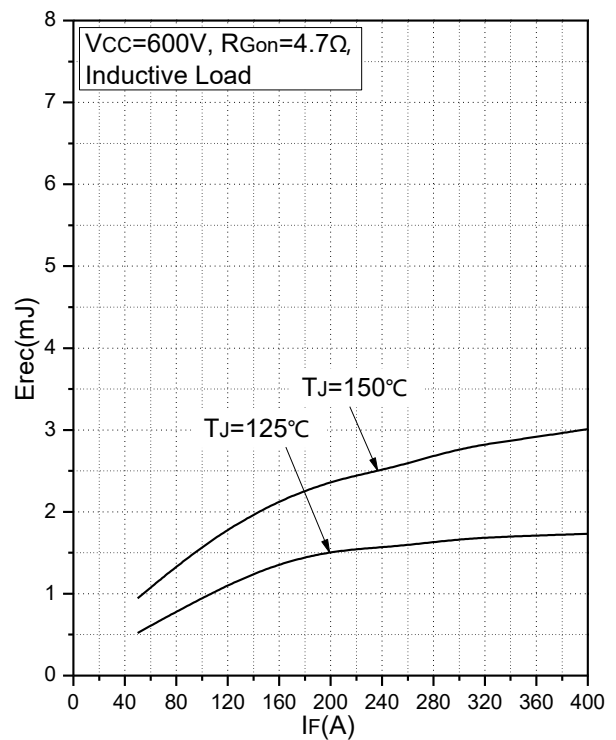
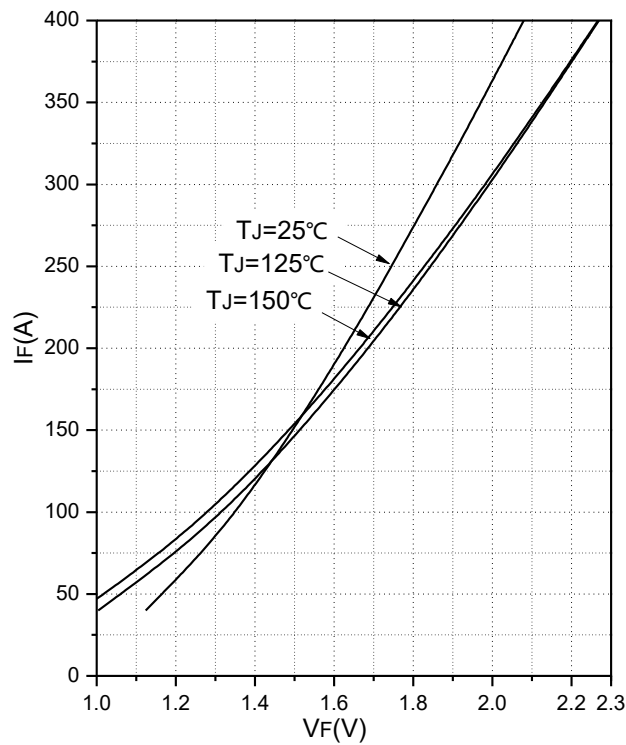
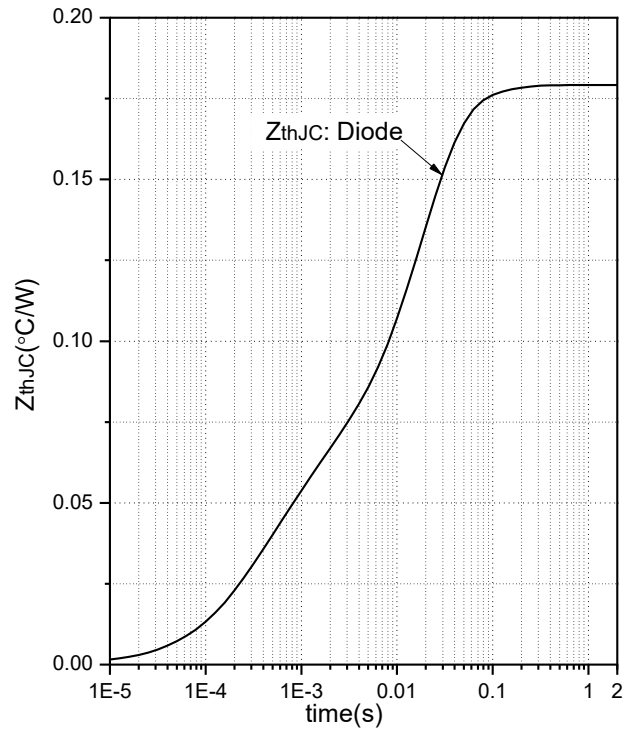
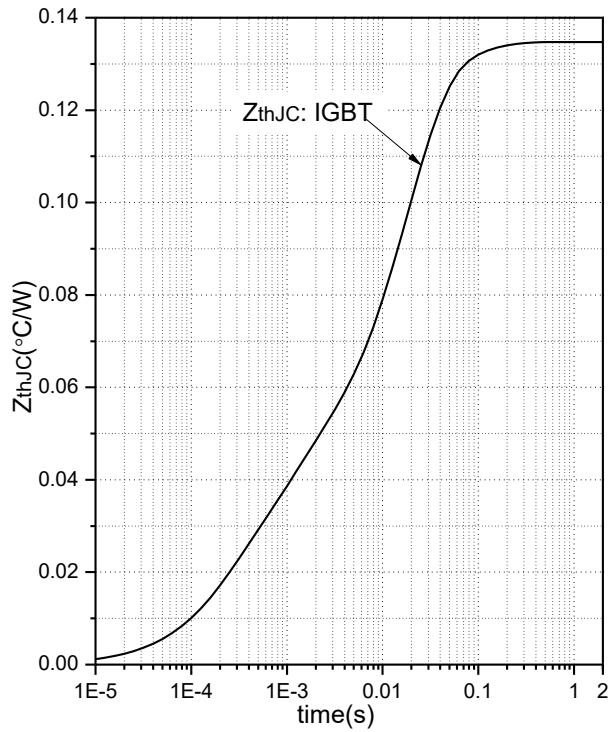
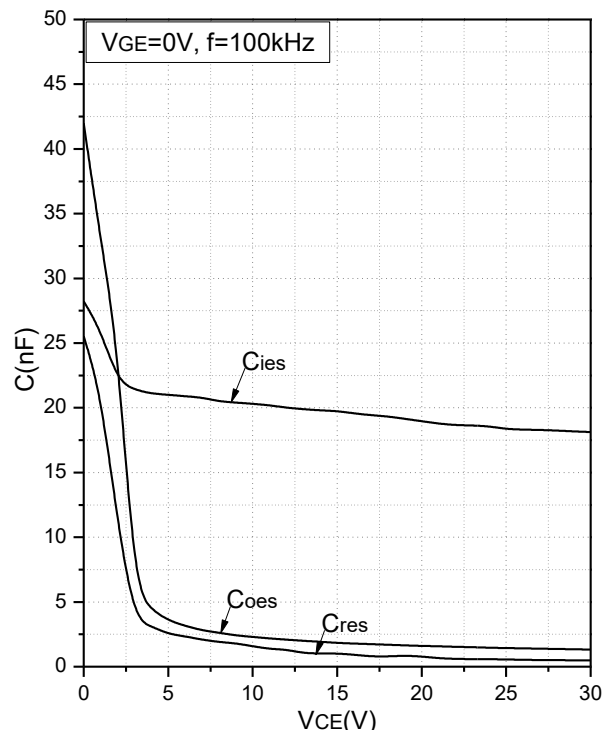
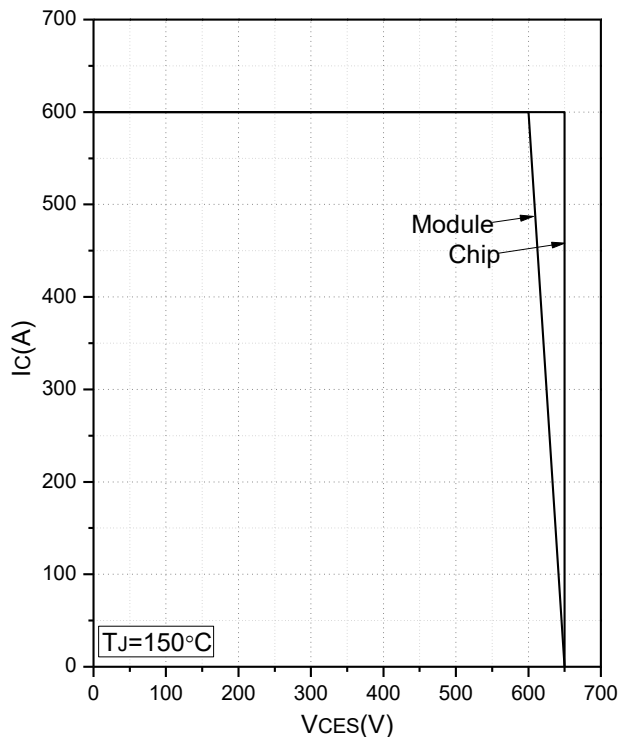
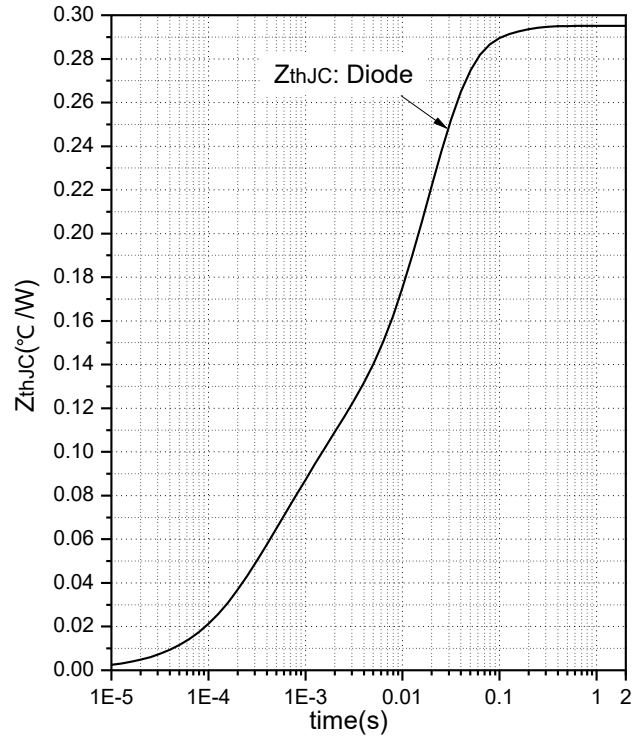
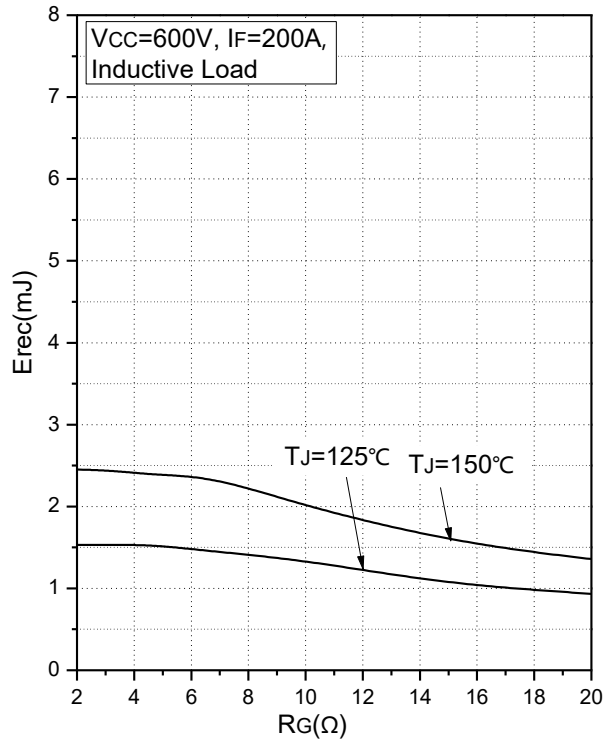


Fig.8 Typical Switching Loss vs. Gate Resistance
D5/D6





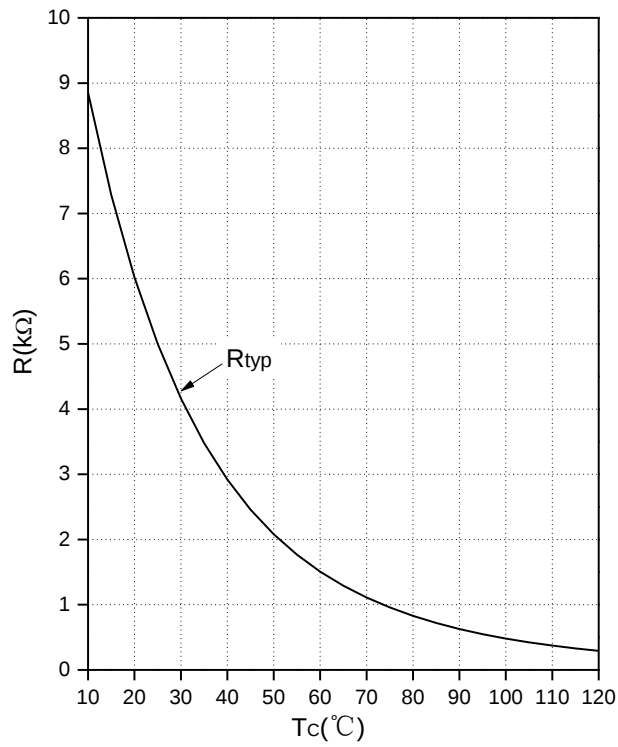
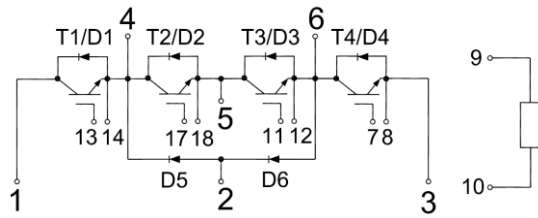
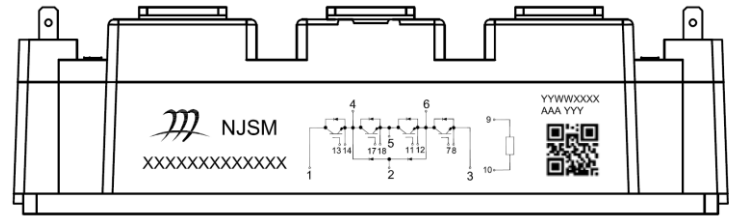


Fig.17 NTC Temperature Characteristics

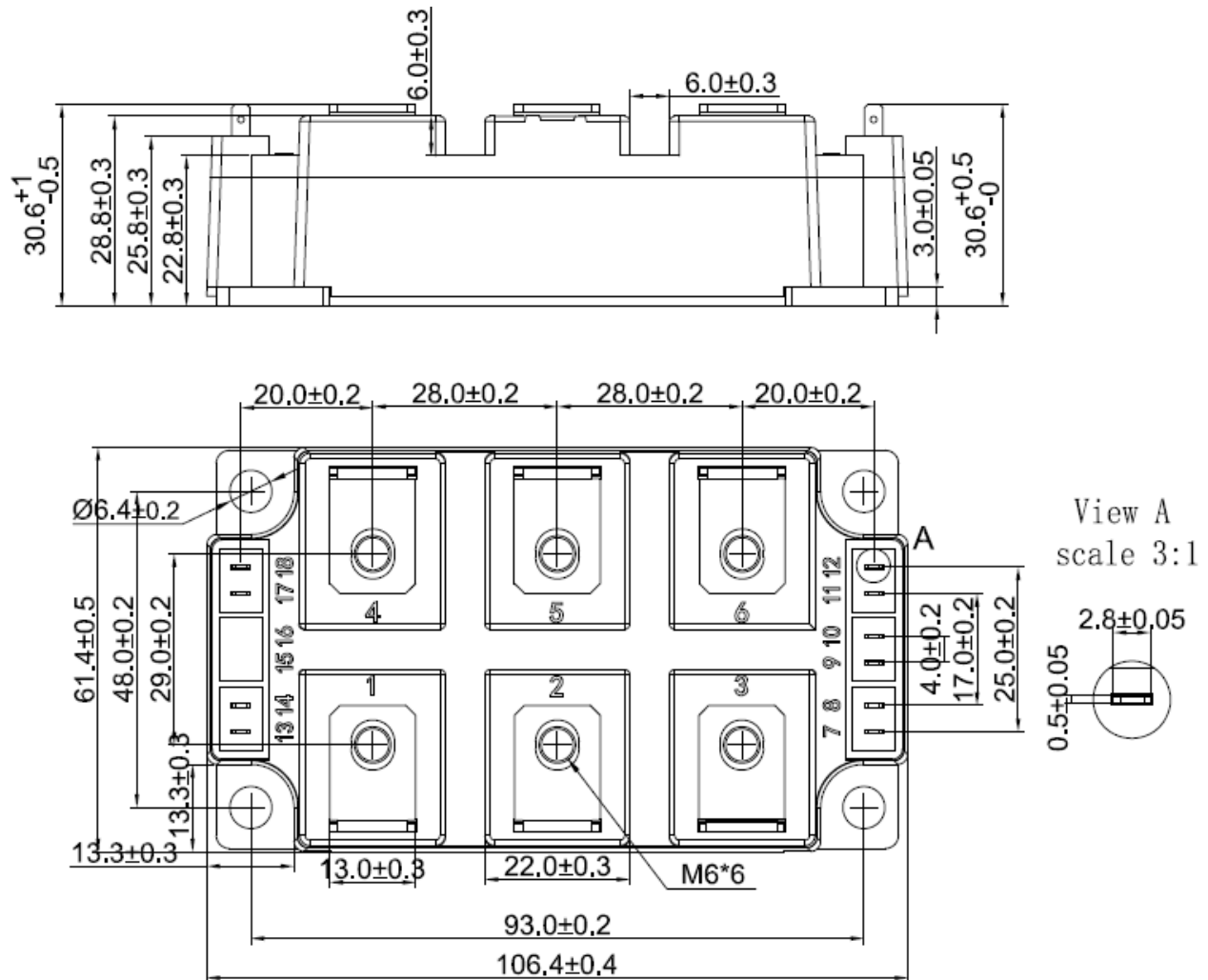
Internal Circuit



Markings



Package Outline (Unit: mm):





Revision	Notes
01	Initial Release

Announcement

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