



GTR200TL65T2SH

IGBT Module

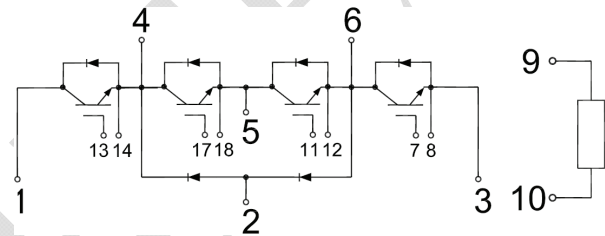
Features:

- Short Circuit Rated 10 μ s
- Low Saturation Voltage: $V_{CE(Sat)} = 1.60V @ I_C = 200A, T_C = 25^\circ C$
- 100% RBSOA Tested ($2 \times I_C$)
- Low Stray Inductance
- HI-REL Power Terminals
- Lead Free, Compliant with RoHS Requirement



Applications:

- UPS and SMPS
- Industrial Inverters
- Servo Applications
- 3 Level Inverter



Internal Circuit Diagram

Absolute Maximum Ratings ($T_C = 25^\circ C$ 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	$T_C = 80^\circ C$	200	A
		$T_C = 25^\circ C$	270	A
$I_{CM(1)}$	Peak Collector Current Repetitive	$T_J = 175^\circ C$	400	A
I_F	Diode Continuous Forward Current	200	A	
I_{FM}	Diode Maximum Forward Current	400	A	
t_{SC}	Short Circuit Withstand Time	$T_J = 150^\circ C$	>10	μs
P_D	Maximum Power Dissipation (IGBT)	$T_C = 25^\circ C$ $T_{Jmax} = 175^\circ C$	600	W
T_J	Maximum Junction Temperature	175	$^\circ C$	
T_{JOP}	Maximum Operating Junction Temperature Range	-40 +150	$^\circ C$	
T_{stg}	Storage Temperature	-40 +125	$^\circ C$	
V_{iso}	Isolation Voltage(All Terminals Shorted)	f = 50Hz, 1minute	2500	V
Mounting Torque	Power Terminals Screw:M6	5.0	N·m	
	Mounting Screw:M6	6.0	N·m	

Notes :

(1) Repetitive Rating: Pulse width limited by max. junction temperature



Electrical Characteristics of IGBT (T_J = 25°C unless otherwise specified)

Symbol	Description	Test Conditions	Min.	Typ.	Max.	Units
OFF Characteristics						
V _{(BR)CES}	Collector-Emitter Breakdown Voltage	V _{GE} = 0V, I _C = 1mA	650			V
I _{CES}	Collector-Emitter Leakage Current	V _{GE} = 0V, V _{CE} = V _{CES}			1	mA
					2	mA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} = V _{GES} , V _{CE} = 0V			300	nA
					600	nA
ON Characteristics						
V _{GE(th)}	Gate-Emitter Threshold Voltage	I _C = 2 mA, V _{CE} = V _{GE}		5.5	6.0	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C = 200A , V _{GE} = 15V		1.60	1.80	V
				1.80		V
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{CE} = 25V, V _{GE} = 0V , f = 1MHz		17.0		nF
C _{oes}	Output Capacitance			0.7		nF
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{CC} = 350V, I _C = 200A , R _G = 15Ω, V _{GE} = ±15V , Inductive Load, T _J = 25°C		725		ns
t _r	Rise Time			280		ns
t _{d(off)}	Turn-off Delay Time			720		ns
t _f	Fall Time			115		ns
E _{on}	Turn-on Switching Loss			17.2		mJ
E _{off}	Turn-off Switching Loss			11.6		mJ
E _{ts}	Total Switching Loss			28.8		mJ
t _{d(on)}	Turn-on Delay Time	V _{CC} = 350V, I _C = 200A, R _G = 15Ω, V _{GE} = ±15V, Inductive Load, T _J = 125°C		730		ns
t _r	Rise Time			285		ns
t _{d(off)}	Turn-off Delay Time			735		ns
t _f	Fall Time			120		ns
E _{on}	Turn-on Switching Loss			19.8		mJ
E _{off}	Turn-off Switching Loss			12.5		mJ
E _{ts}	Total Switching Loss			32.3		mJ
Q _g	Total Gate Charge	V _{CE} = 350V, I _C = 200A, V _{GE} = -15V ~ +15V		1680		nC
R _g	Internal Gate Resistor	T _J = 25°C		3.3		Ω
RBSOA	Reverse Bias Safe Operating Area	I _C = 400A , V _{CC} = 480V, V _p = 650V, R _G = 15Ω, V _{GE} = +15V to 0V, T _J = 150°C	Trapezoid			
SCSOA	Short Circuit Safe Operating Area	V _{CC} = 350V, V _{GE} = 15V, T _J = 150°C	10			μs



Diode, 3-Level

Electrical Characteristics (T_J = 25°C unless otherwise specified)

Symbol	Description	Test conditions	Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F = 200A, V _{GE} = 0V	T _J = 25°C	1.70		V
			T _J = 125°C	1.90		
t _{rr}	Reverse Recovery Time	I _F = 200A, di/dt = 795A/μs, V _{rr} = 350V, V _{GE} = -15V	T _J = 25°C	175		ns
			T _J = 125°C	440		
I _{rr}	Peak Reverse Recovery Current	I _F = 200A, di/dt = 795A/μs, V _{rr} = 350V, V _{GE} = -15V	T _J = 25°C	55		A
			T _J = 125°C	70		
Q _{rr}	Reverse Recovery Charge	I _F = 200A, di/dt = 795A/μs, V _{rr} = 350V, V _{GE} = -15V	T _J = 25°C	5.4		μC
			T _J = 125°C	12.0		

Diode, Inverter

Electrical Characteristics (T_J = 25°C unless otherwise specified)

Symbol	Description	Test conditions	Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F = 200A, V _{GE} = 0V	T _J = 25°C	1.70		V
			T _J = 125°C	1.90		
t _{rr}	Reverse Recovery Time	I _F = 200A, di/dt = 795A/μs, V _{rr} = 350V, V _{GE} = -15V	T _J = 25°C	175		ns
			T _J = 125°C	440		
I _{rr}	Peak Reverse Recovery Current	I _F = 200A, di/dt = 795A/μs, V _{rr} = 350V, V _{GE} = -15V	T _J = 25°C	55		A
			T _J = 125°C	70		
Q _{rr}	Reverse Recovery Charge	I _F = 200A, di/dt = 795A/μs, V _{rr} = 350V, V _{GE} = -15V	T _J = 25°C	5.4		μC
			T _J = 125°C	12.0		

NTC Thermistor

Characteristic values

Symbol	Condition	Typ.	Max.	Units
R ₂₅	T _C = 25°C	5		kΩ
ΔR/R	T _C = 100°C, R ₁₀₀ = 481Ω		±5	%
P ₂₅	T _C = 25°C	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

Thermal Resistance Characteristics

Symbol	Description	Typ.	Max.	Units
R _{θJC}	Junction-To-Case (IGBT Part, Per Leg)		0.25	°C/W
R _{θJC}	Junction-To-Case (Diode Part, Per Leg)		0.45	°C/W
R _{θJC}	Junction-To-Case (Diode- Freewheeling, Per Leg)		0.45	°C/W
R _{θCS}	Case-To-Sink (Conductive Grease Applied)		0.10	°C/W
Mounting Torque	Power Terminals Screw:M6	3.0	5.0	N·m
	Mounting Screw:M6	4.0	6.0	N·m
Weight	Weight Of Module	345		g

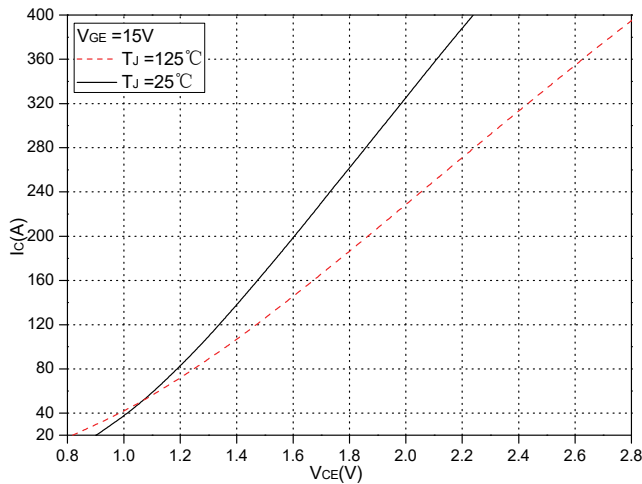


Fig.1 Typical Saturation Voltage Characteristics

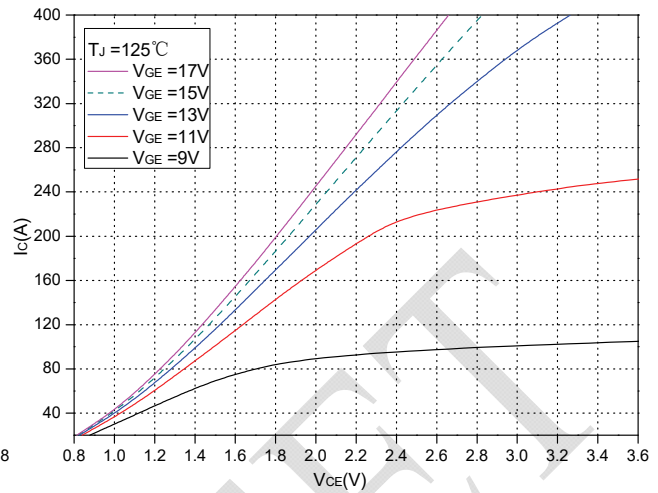


Fig.2 Typical Output Characteristics

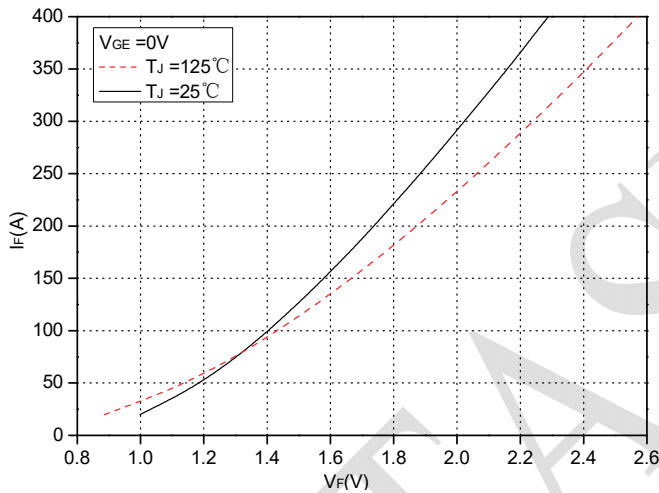


Fig.3 Forward Characteristics (Diode, 3-Level)

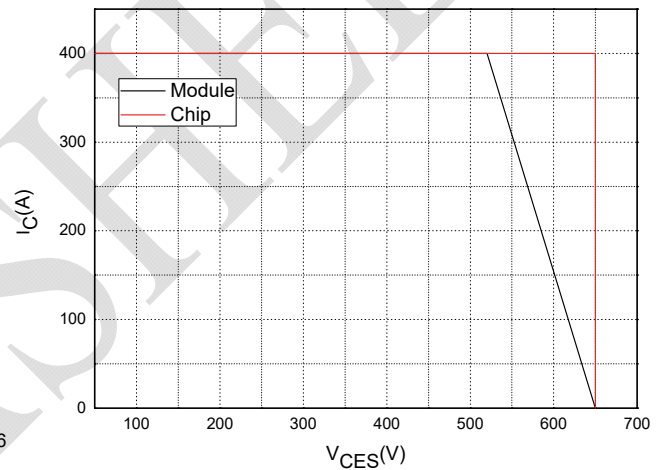


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

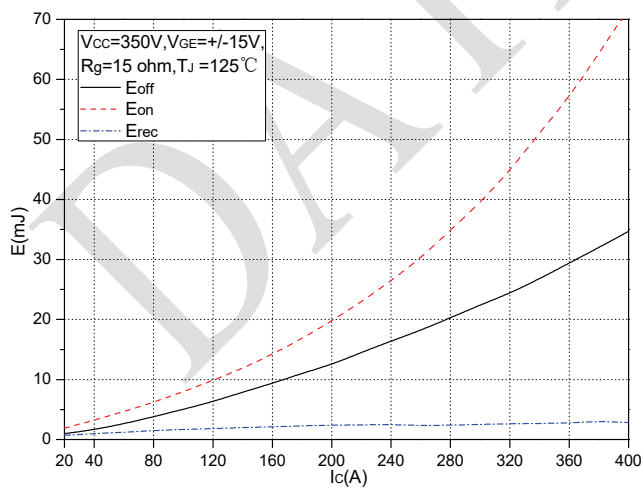


Fig.5 Typical Switching Loss vs. Collector Current (Tj=125°C)

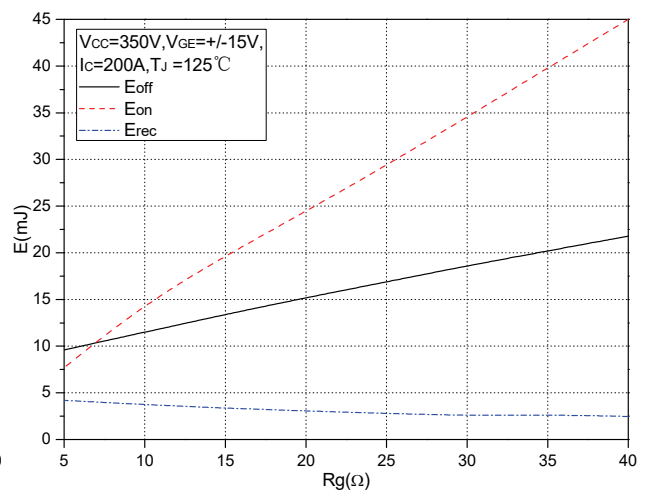


Fig.6 Typical Switching Loss vs. Gate Resistance (Tj=125°C)

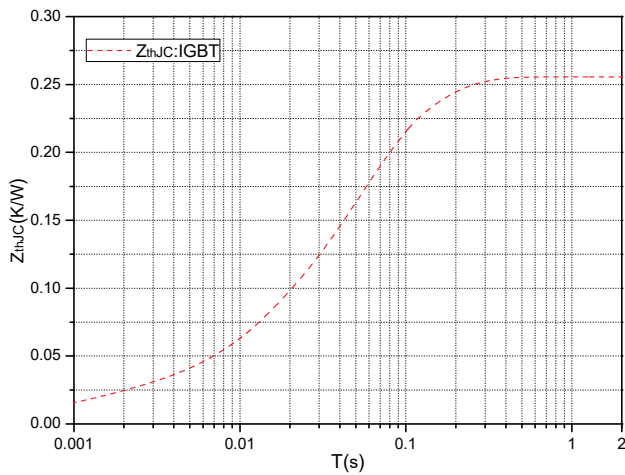


Fig.7 Transient thermal impedance (IGBT)

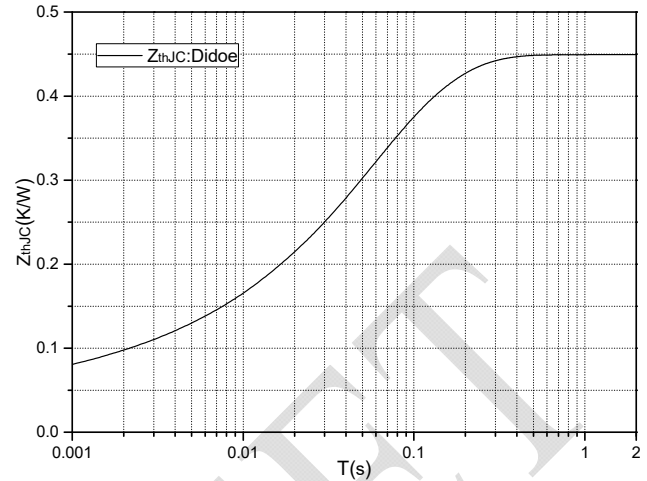


Fig.8 Transient thermal impedance (Diode)

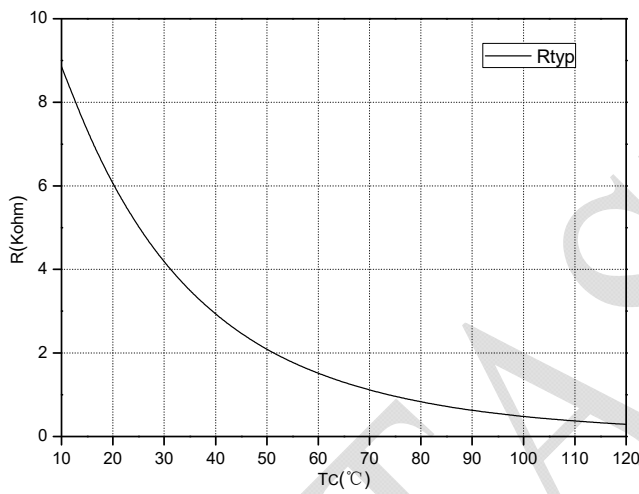


Fig.9 NTC Temperature characteristics

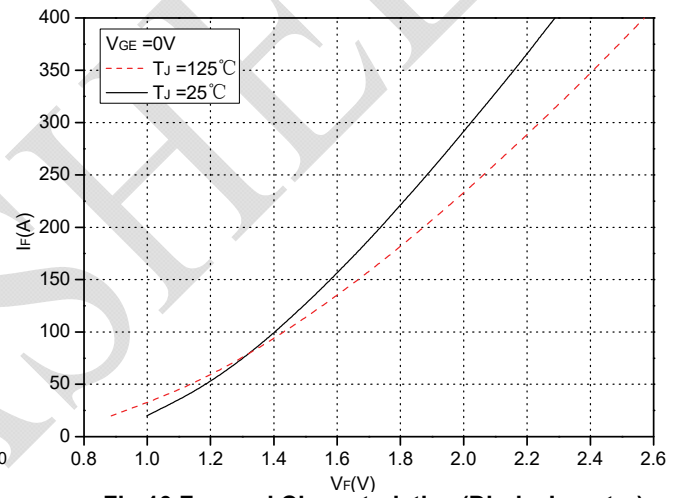
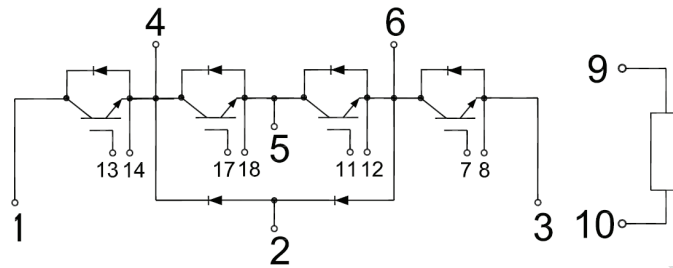


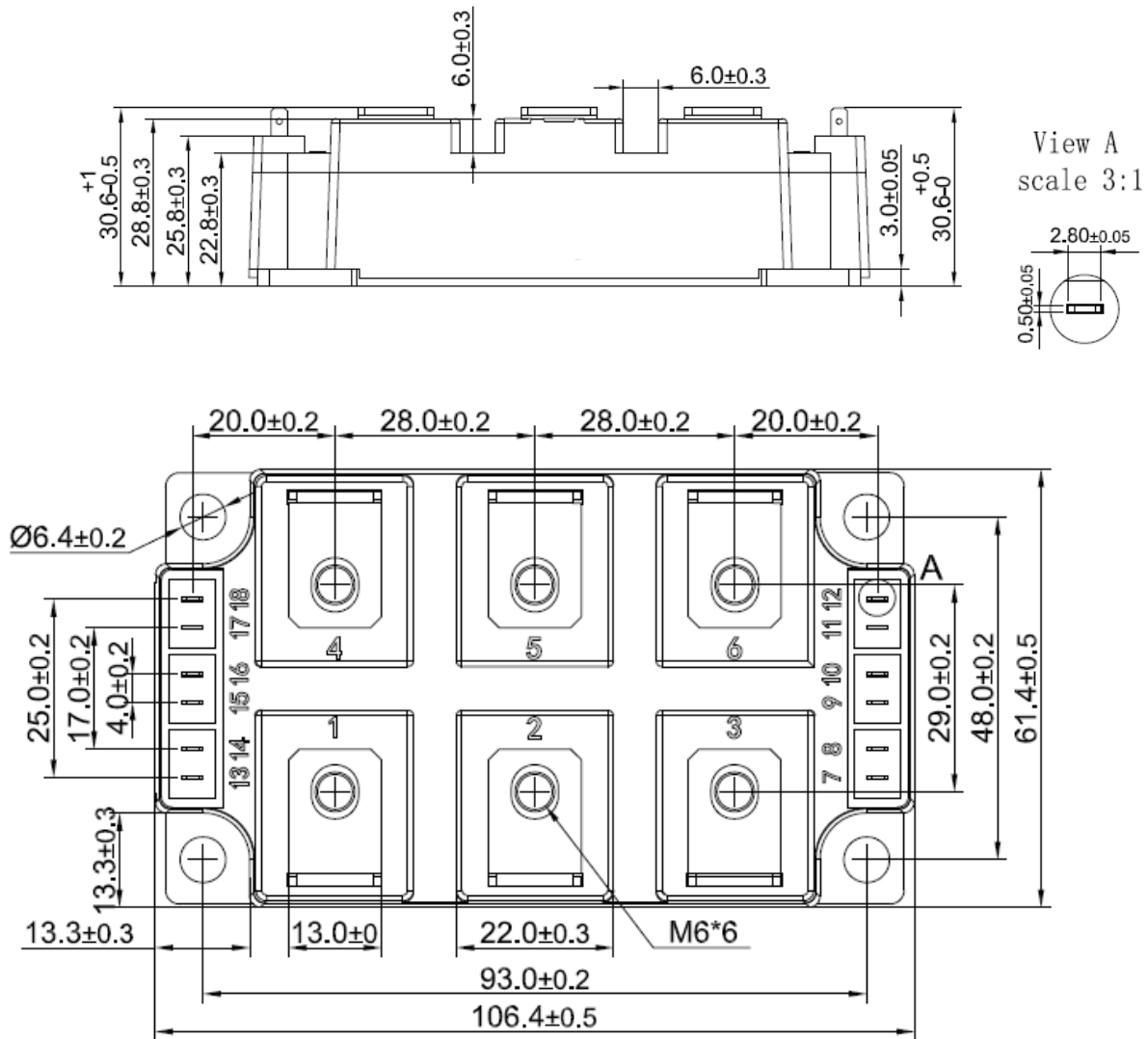
Fig.10 Forward Characteristics (Diode, Inverter)



Internal Circuit Diagram:



Package Outline (Unit: mm):



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