

IGBT Module

Features:

- Short Circuit Rated 10 μ s
- Low Saturation Voltage: VCE (sat) = 1.60V @ IC = 450A , TC=25 $^{\circ}$ C
- Low Switching Loss
- 100% RBSOA Tested (2 $\times$ IC)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications:

- UPS
- High Power Converters
- Motor Drives
- Servo Drives
- Wind Turbines

IGBT, Inverter

Maximum Rated Values (TC=25 $^{\circ}$ C Unless otherwise specified)

V _{CES}	Collector-Emitter Blocking Voltage		650	V
V _{GES}	Gate-Emitter Voltage		$\pm$ 20	V
I _C	Continuous Collector Current	T _C = 80 $^{\circ}$ C,	450	A
		T _C = 25 $^{\circ}$ C	740	A
I _{CM}	Peak Collector Current Repetitive	T _J = 175 $^{\circ}$ C	900	A
t _{SC}	Short Circuit Withstand Time		>10	μ s
P _D	Maximum Power Dissipation (IGBT)	T _C = 25 $^{\circ}$ C T _J = 175 $^{\circ}$ C	1630	W



SL450H65TL

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	$I_C = 3 \text{ mA}$, $V_{CE} = V_{GE}$	3.0	5.5	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 450 \text{ A}$, $V_{GE} = 15 \text{ V}$	$T_J = 25^{\circ}\text{C}$	1.60	1.90	V
			$T_J = 125^{\circ}\text{C}$	1.80		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	$V_{GE} = \pm 20 \text{ V}$, $V_{CE} = 0 \text{ V}$, $T_J = 25^{\circ}\text{C}$			400	nA
C_{ies}	Input Capacitance	$V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$, $f = 1 \text{ MHz}$		37.5		nF
C_{oes}	Output Capacitance			1.50		nF
C_{res}	Reveres transfer capacitance			1.20		nF

Switching Characteristics

Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 300V, I_C = 450A,$ $R_G = 15\Omega, V_{GE} = \pm 15V,$ Inductive Load	$T_J = 25^{\circ}C$		1624	ns
			$T_J = 125^{\circ}C$		1602	
			$T_J = 150^{\circ}C$		1609	
t_r	Rise Time		$T_J = 25^{\circ}C$		521	ns
			$T_J = 125^{\circ}C$		511	
			$T_J = 150^{\circ}C$		508	
$t_{d(off)}$	Turn-off Delay Time		$T_J = 25^{\circ}C$		1431	ns
			$T_J = 125^{\circ}C$		1527	
			$T_J = 150^{\circ}C$		1542	
t_f	Fall Time		$T_J = 25^{\circ}C$		212	ns
			$T_J = 125^{\circ}C$		220	
			$T_J = 150^{\circ}C$		212	
E_{on}	Turn-on Switching Loss		$T_J = 25^{\circ}C$		47	mJ
			$T_J = 125^{\circ}C$		52	
			$T_J = 150^{\circ}C$		52	
E_{off}	Turn-off Switching Loss	$T_J = 25^{\circ}C$		41	mJ	
		$T_J = 125^{\circ}C$		43		
		$T_J = 150^{\circ}C$		44		
Q_g	Total Gate Charge	$T_J = 25^{\circ}C$		3133	nC	
		$T_J = 125^{\circ}C$		3103		
		$T_J = 150^{\circ}C$		3120		
R_g	Internal Gate Resistor		$T_J = 25^{\circ}C$		3.3	Ω
RBSOA	Reverse Bias Safe Operation Area	$IC=900A, V_{CC}=600V, V_p=650V,$ $R_g=15\Omega, V_{GE}=+15V$ to $0V, T_J=150^{\circ}C$		Trapezoid		
SCSOA	Short Circuit Safe Operation Area	$V_{CC} = 600V, V_{GE} = 15V,$ $T_J = 150^{\circ}C$		10		μs
$R_{\theta JC}$	Junction-To-Case				0.092	$^{\circ}C/W$



SL450H65TL

Diode, Inverter

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

V_{RRM}	Repetitive peak reverse voltage	650	V
I_F	Diode Continuous Forward Current	450	A
I_{FM}	Peak FWD Current Repetitive	900	A

Electrical Characteristics of FWD ($T_C=25^{\circ}\text{C}$ Unless otherwise specified)

Symbol	Description	Conditions		Min	Typ	Max	Unit
V _{FM}	Forward Voltage	I _F = 450A , V _{GE} = 0V	T _J = 25°C		1.80		V
			T _J = 125°C		1.80		
			T _J = 150°C		1.80		
I _{rr}	Peak Reverse Recovery Current	I _F =450A, di/dt =780A/μs, V _{rr} = 300V, V _{GE} = -15V	T _J = 25°C		62		A
			T _J = 125°C		81		
			T _J = 150°C		87		
Q _{rr}	Reverse Recovery Charge		T _J = 25°C		6.2		μC
			T _J = 125°C		13.7		
			T _J = 150°C		15.8		
E _{rec}	Reverse Recovery Energy		T _J = 25°C		6.4		mJ
			T _J = 125°C		1.7		
			T _J = 150°C		2.0		
R _{θJC}	Diode Thermal Resistance: Junction-To-Case				0.176		°C/W



SL450H65TL

Internal NTC- Thermistor Characteristic

R ₂₅	T _C =25℃	5		kΩ
△R/R	T _C =100℃, R ₁₀₀ =481Ω		±5	%
P ₂₅	T _C =25℃	50		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

Module

Symbol	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 _{θCS}	Case-To-Sink (Conductive Grease Applied)			0.1		℃/W
M	Power Terminals Screw:M5		3.0		5.0	N·m
M	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			300		g

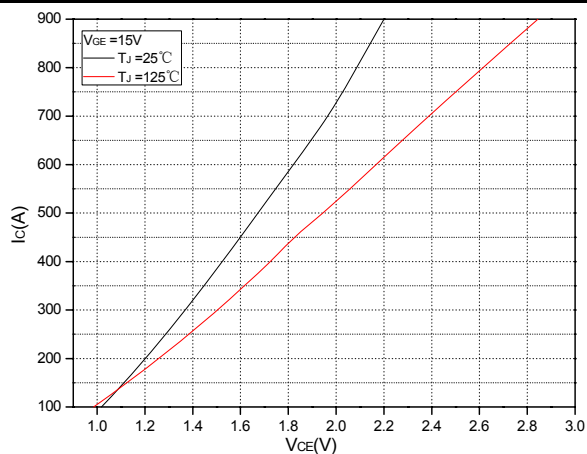


Fig.1 Typical Saturation Voltage Characteristics

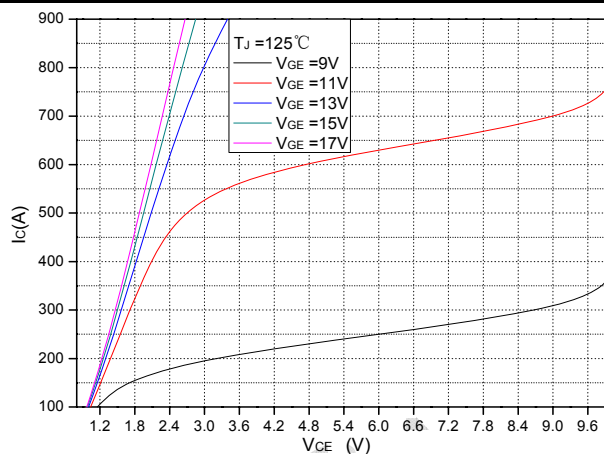


Fig.2 Typical Output Characteristics

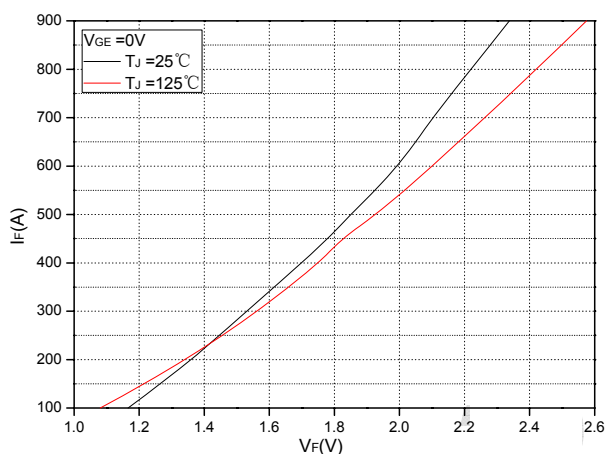


Fig.3 Forward Characteristics of FWD

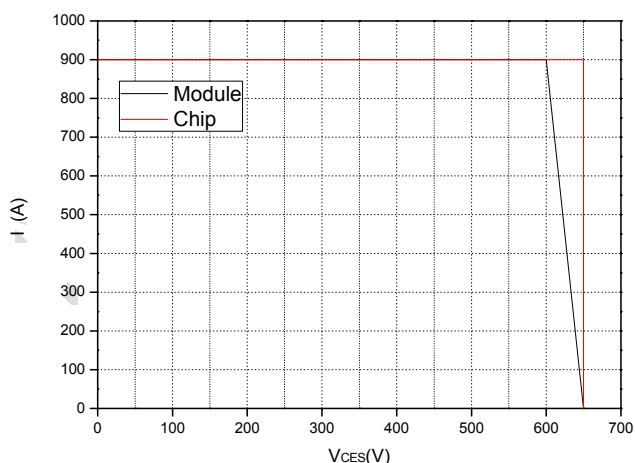


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

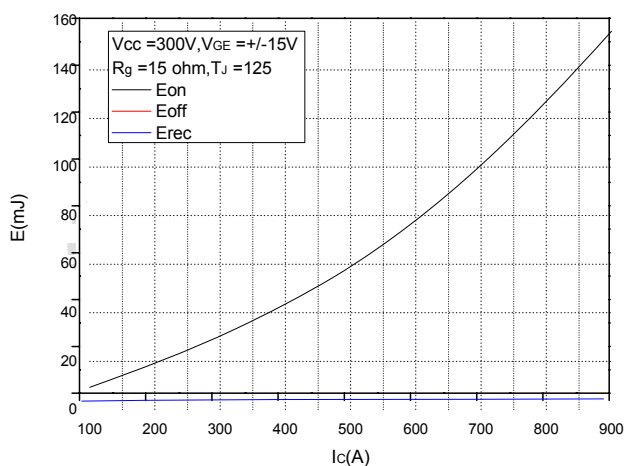


Fig.5 Typical Switching Loss vs. Collector Current

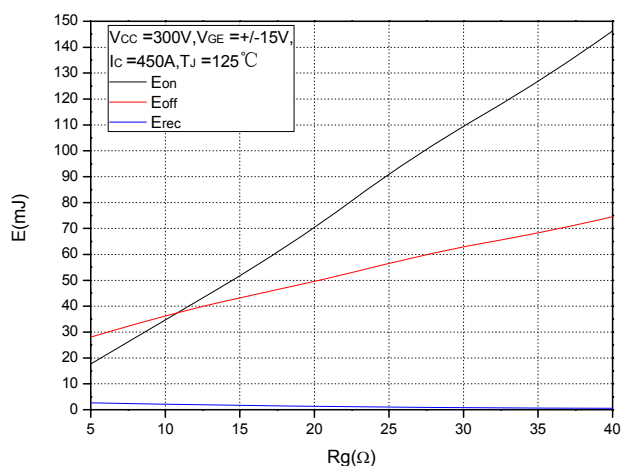


Fig.6 Typical Switching Losses vs. Gate Resistance

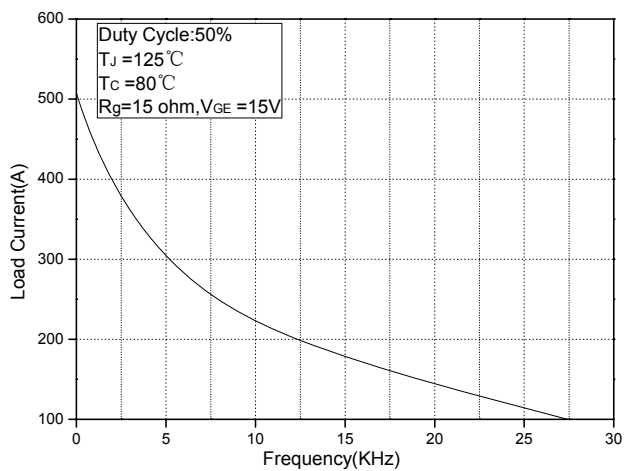


Fig.7 Typical Load Current vs. Frequency

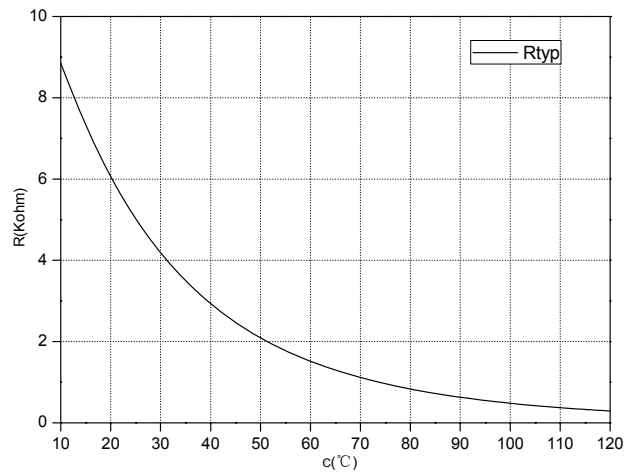


Fig.8 NTC Temperature characteristics

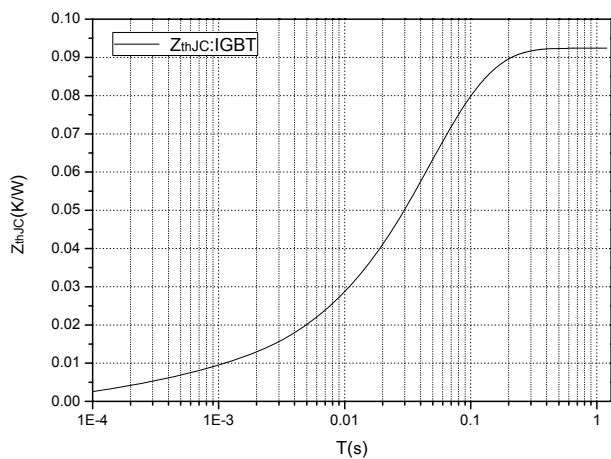


Fig.9 Transient thermal impedance (IGBT)

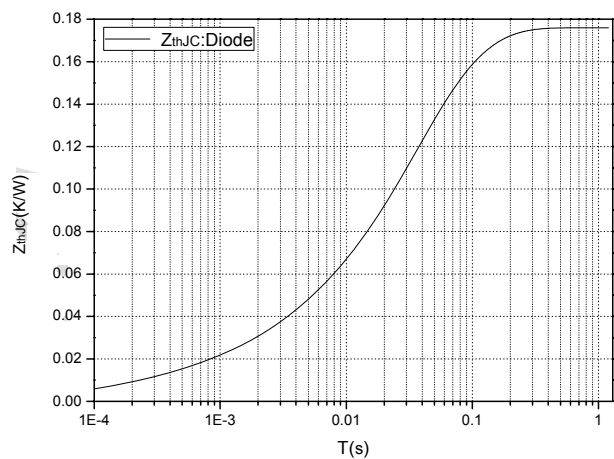


Fig.10 Transient thermal impedance (Diode)

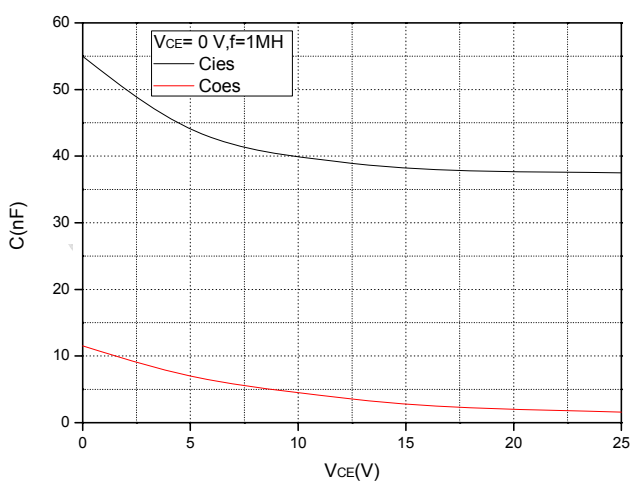
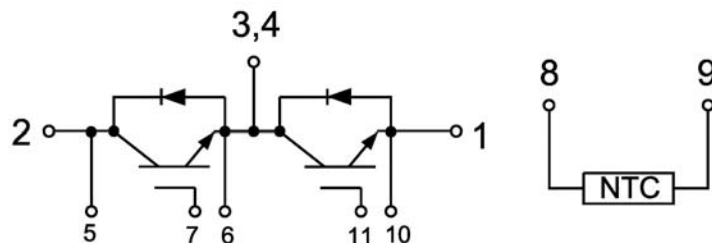
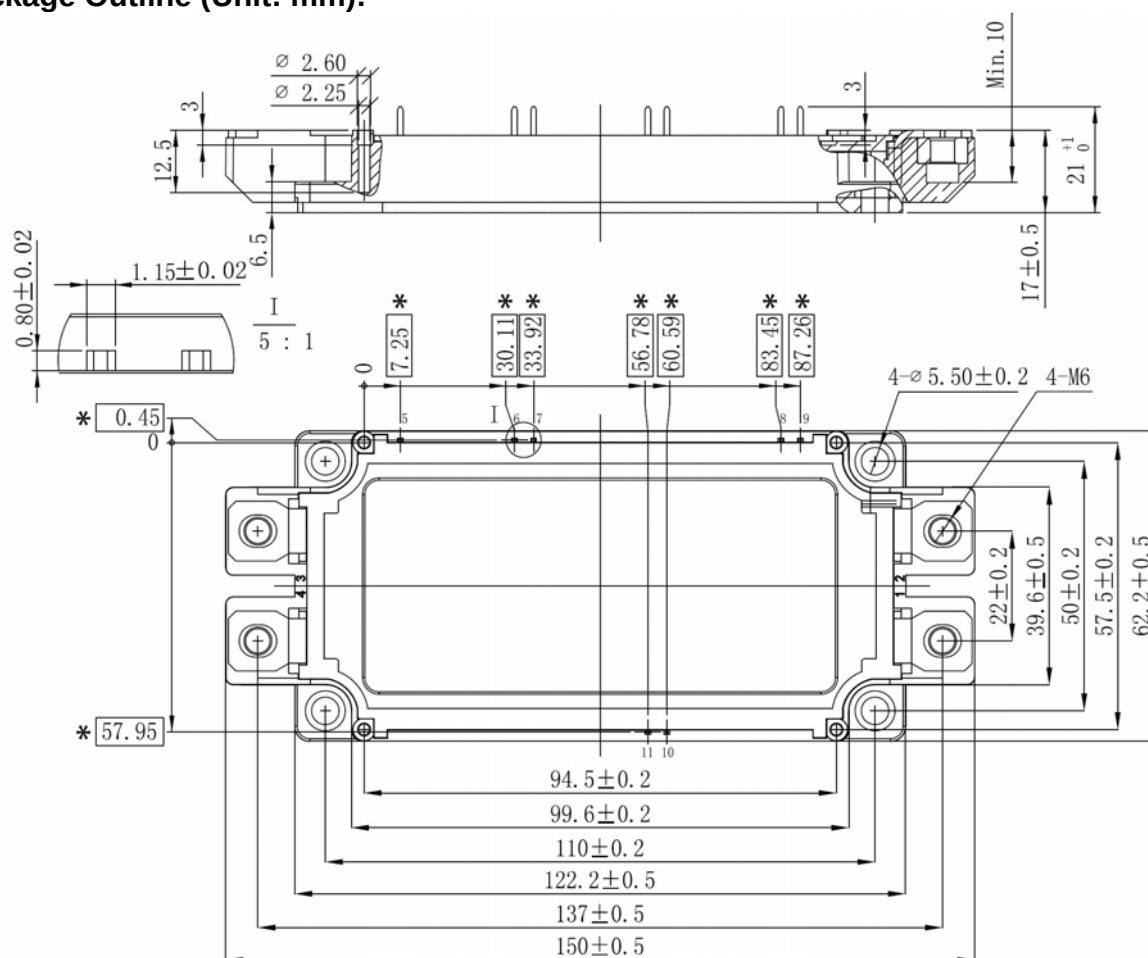


Fig.11 Capacitance Characteristics

Internal Circuit



Package Outline (Unit: mm):



*=all dimensions with tolerance of ± 0.5