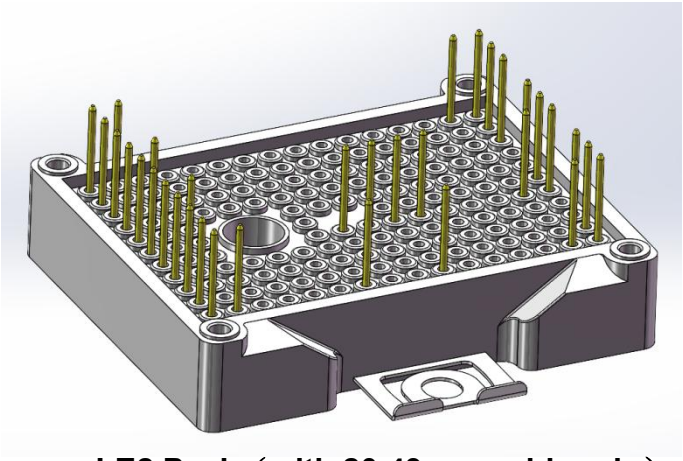
JLAFF50B120RE2F7SN

LE2 PACK module with Trench/Fieldstop IGBT and Emitter Controlled diode and NTC

RoHS

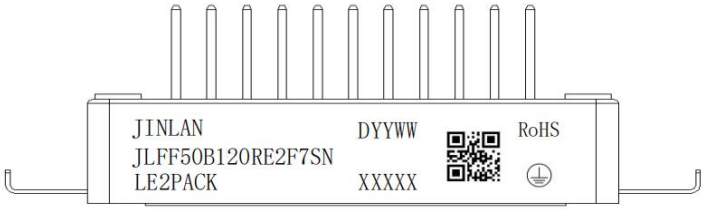
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Overload operation up to 175℃
- Low inductance case
- Isolated heatsink using DBC technology
- High power density



LE2 Pack（with 20.43mm solder pin）

MARKING DIAGRAM

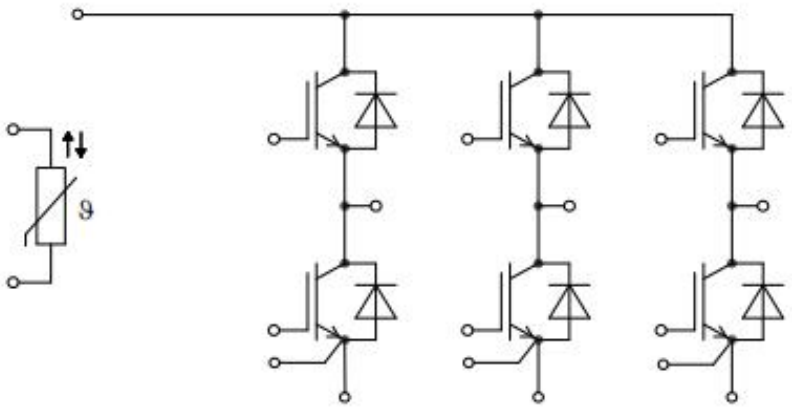


JINLAN	= Company Name
JLAFF50B120RE2F7SN	= Specific Device Code
YYWW	= Year and Work Week Code
XXXXX	= Serial Number
QR code	= Custom Assembly Information

Typical Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply
- Air Conditioning
- UPS Systems

Description



Package Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS,f=50Hz,t=60s	2.5	kV
Internal isolation		basic insulation(class 1,IEC 61140)	Al_2O_3	
Creepage distance	d_{creep}	terminal to heatsink	11.5	mm
Creepage distance	d_{creep}	terminal to terminal	6.3	mm
Clearance	d_{clear}	terminal to heatsink	10	mm
Clearance	d_{clear}	terminal to terminal	5	mm
Comparative tracking index (electrical)	CTI		>200	

Package Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray Inductance	L_{CE}		--	40	--	nH
Module Lead Resistance, Terminal to Chip	$R_{CC'+EE'}$		--	4.00	--	mΩ
Storage Temperature Range	T_{STG}		-40		125	℃
Mountig force per clamp	F		40	--	80	N
Weight	G			41.2		g

IGBT

Absolute Maximum Ratings (Tc = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±25	V
I_C	Collector Current @ T_C=25℃	100	A
	Collector Current @ T_C=100℃	50	A
I_{CM}	Pulsed Collector Current，t_p limited by $T_{vj\ max}$	100	A
Tjmax	Maximum Junction Temperature	175	℃
P_D	Power Dissipation @ T_C = 25°C	270	W
	Power Dissipation @T_C = 100 °C	108	W

Characteristics (Tc = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
$V_{CE(sat)}$	Collector−Emitter Saturation Voltage	V_{GE} = 15 V, I_C = 50 A, T_{vj} = 25°C	--	1.80	2.20	V
		V_{GE} = 15 V, I_C = 50 A, T_{vj} = 125°C	--	1.95	--	
		V_{GE} = 15 V, I_C = 50 A, T_{vj} = 150°C	--	2.00	--	
$V_{GE(TH)}$	Gate−Emitter Threshold Voltage	V_{GE} = V_{CE} , I_C = 1 mA,T_{vj} = 25°C	5.0	6.0	7.0	V
I_{CES}	Collector−Emitter Cutoff Current	V_{GE} = 0 V, V_{CE} =V_{CES} ,T_{vj} = 25°C	--	--	200	μA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = V_{GES} , V_{CE} = 0 V， T_{vj} = 25°C	--	--	200	nA
RGint	Internal Gate Resistance		--	1.27	--	Ω
Cies	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V	--	5.07	--	nF
Cres	Reverse Transfer		--	0.13	--	nF
Q_G	Gate Charge	V_{GE}=15V, I_C=50A	--	0.19	--	μC
td(on)	Turn−On Delay Time	V_{CC} = 600 V, I_C = 50 A R_{Gon} = 10Ω,R_{Goff} = 25Ω ,V_{GE} =±15V Inductive Load T_{vj} = 25°C	--	110	--	ns
tr	Rise Time		--	30	--	
td(off)	Turn−off Delay Time		--	180	--	
tf	Fall Time		--	190	--	
Eon	Turn−On Switching Loss per Pulse		--	2.83	--	mJ
Eoff	Turn Off Switching Loss per Pulse		--	4.42	--	
td(on)	Turn−On Delay Time	V_{CC} = 600 V, I_C = 50 A R_{Gon} = 10Ω,R_{Goff} = 25Ω ,V_{GE} =±15V Inductive Load T_{vj} = 125°C	--	120	--	ns
tr	Rise Time		--	30	--	
td(off)	Turn−off Delay Time		--	230	--	
tf	Fall Time		--	340	--	
Eon	Turn−on Switching Loss per Pulse		--	4.16	--	mJ
Eoff	Turn Off Switching Loss per Pulse		--	5.24	--	
td(on)	Turn−On Delay Time	V_{CC} = 600 V, I_C = 50 A R_{Gon} = 10Ω,R_{Goff} = 25Ω ,V_{GE} =±15V Inductive Load T_{vj} = 150°C	--	110	--	ns
tr	Rise Time		--	40	--	
td(off)	Turn−off Delay Time		--	240	--	
tf	Fall Time		--	330	--	
Eon	Turn−on Switching Loss per Pulse		--	4.87	--	mJ
Eoff	Turn Off Switching Loss per Pulse		--	5.49	--	
ISC	SC Data	t_P≤10μs,V_{GE} ≤15V, T_{vj} =150℃,V_{CC}=800V, V_{CEmax}=V_{CES} -L_{sCE}*di/dt	--	130	--	A
RthJC	Thermal resistance	Junction-to-Case (per IGBT)	--	0.42	0.489	K/W
$T_{vj\ op}$		Temperature under switching conditions	-40		1751)	℃

[1)] $T_{vj\ op}$ > 175℃ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

Diode

Absolute Maximum Ratings (Tc = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	50	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	100	A

Characteristics （Tc=25℃ unless otherwise noted）

V_F	Diode Forward Voltage	I_F = 50A, V_{GE}=0V， T_{vj} = 25°C	--	1.80	2.80	V
		I_F = 50A, V_{GE}=0V， T_{vj} = 125°C	--	1.75	--	
		I_F = 50A, V_{GE}=0V， T_{vj} = 150°C	--	1.70	--	
Qr	Recovered Charge	V_R=600V,I_F=50A, R_{Gon} = 10Ω,R_{Goff} = 25Ω, V_{GE} =±15V ,T_{vj}=25℃	--	0.48	--	μC
IRM	Peak Reverse Recovery Current		--	40	--	A
Trr	Reverse Recovery Time		--	16.5	--	ns
Erec	Reverse Recovery Energy		--	0.65	--	mJ
Qr	Recovered Charge	V_R=600V,I_F=50A, R_{Gon} = 10Ω,R_{Goff} = 25Ω, V_{GE} =±15V ,T_{vj}=125℃	--	0.67	--	μC
IRM	Peak Reverse Recovery Current		--	25	--	A
Trr	Reverse Recovery Time		--	36.5	--	ns
Erec	Reverse Recovery Energy		--	0.96	--	mJ
Qr	Recovered Charge	V_R=600V,I_F=50A, R_{Gon} = 10Ω,R_{Goff} = 25Ω, V_{GE} =±15V ,T_{vj}=150℃	--	1.72	--	μC
IRM	Peak Reverse Recovery Current		--	27	--	A
Trr	Reverse Recovery Time		--	42.9	--	ns
Erec	Reverse Recovery Energy		--	1.01	--	mJ
RthJC	Thermal resistance	Junction-to-Case (per diode)	--	0.68		K/W
$T_{vj\ op}$		Temperature under switching conditions	-40		175[2)]	℃

[2)] $T_{vj\ op}$ > 175℃ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

NTC Characteristics (Tc = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
R_{25}	Rated Resistance		--	5.0	--	kΩ
ΔR/R	Deviation of R100	Tc=100 ℃,R100=493.3Ω	-5	--	5	%
P_{25}	Power Dissipation		--	--	20.0	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2- 1/(298.15K))]$	--	3375	--	K
$B_{25/80}$	B-value	$R_2=R_{25}\exp[B_{25/80}(1/T_2- 1/(298.15K))]$	--	3411	--	K
$B_{25/100}$	B-value	$R_2=R_{25}\exp[B_{25/100}(1/T_2- 1/(298.15K))]$	--	3433	--	K

Figure 1.Typical Output Characteristics

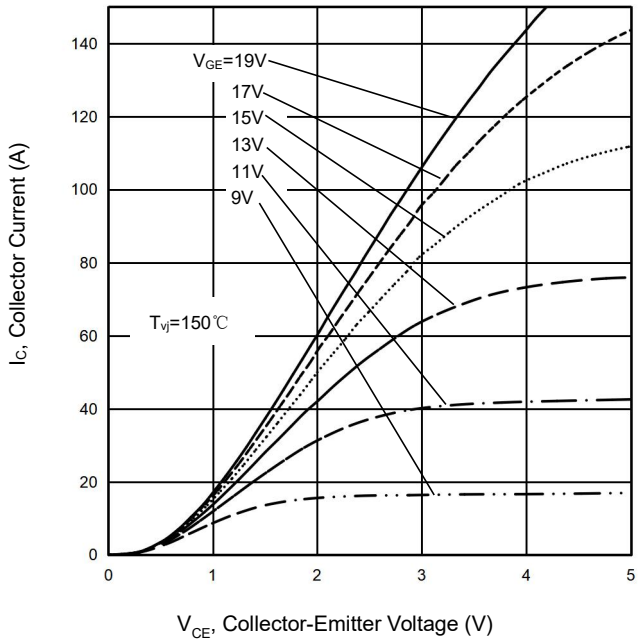


Figure 2.Typical Transfer Characteristics

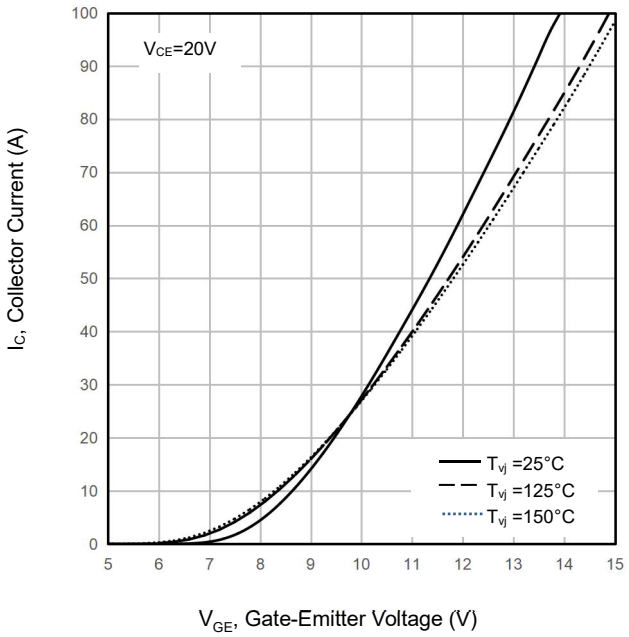


Figure 3.Switching Loss vs. Collector Current

V_{CE}=600V,V_{GE}=±15V,R_G=10Ω

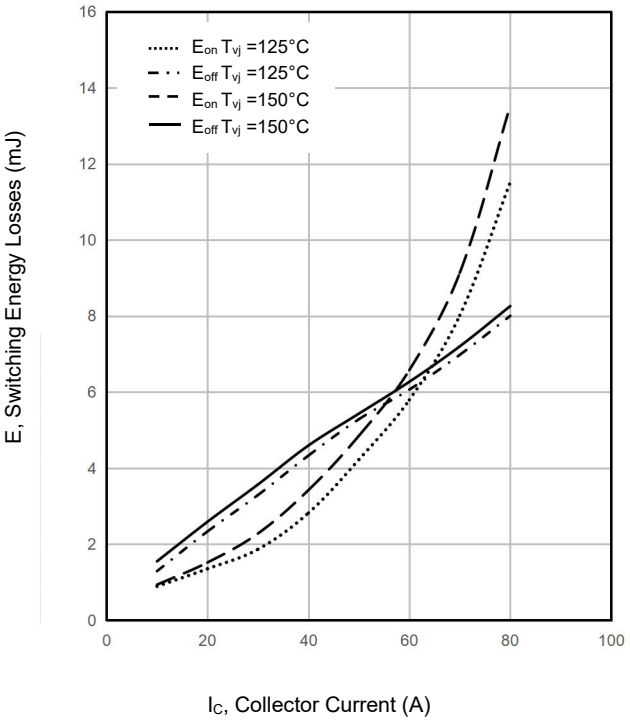


Figure 4.Switching Loss vs. RG

V_{CE}=600V,V_{GE}=±15V,I_C=50A

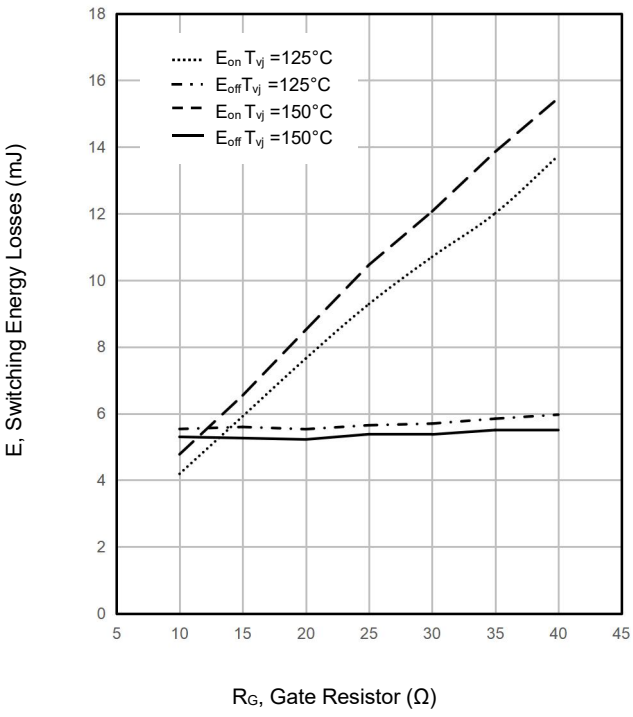


Figure 5.Switching Time IGBT

V_{CE}=600V,V_{GE}=±15V,R_G=10Ω,T_{vj}= 150℃

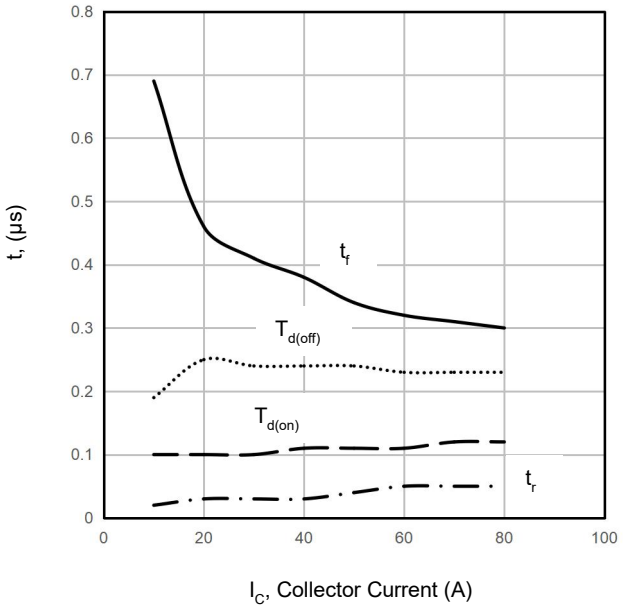


Figure 6.Capacitance IGBT

f=100KHz,V_{GE}=0V

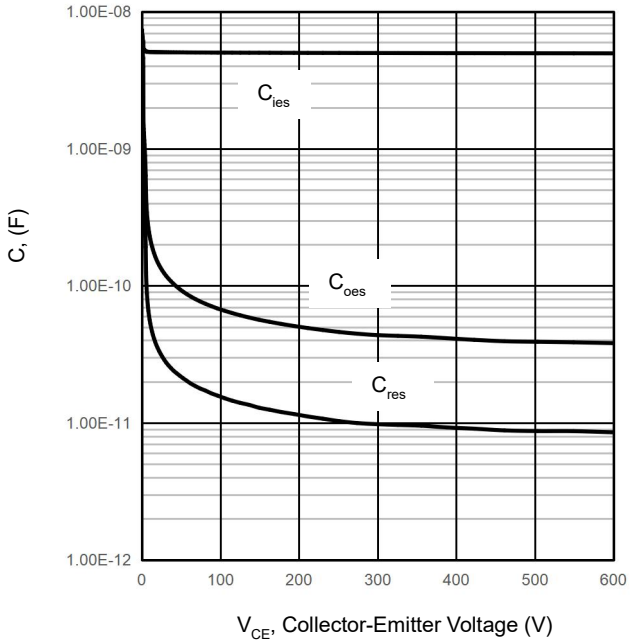


Figure 7.Gate Voltage

V_{CE}=600V,V_{GE}=15V,I_C=50A

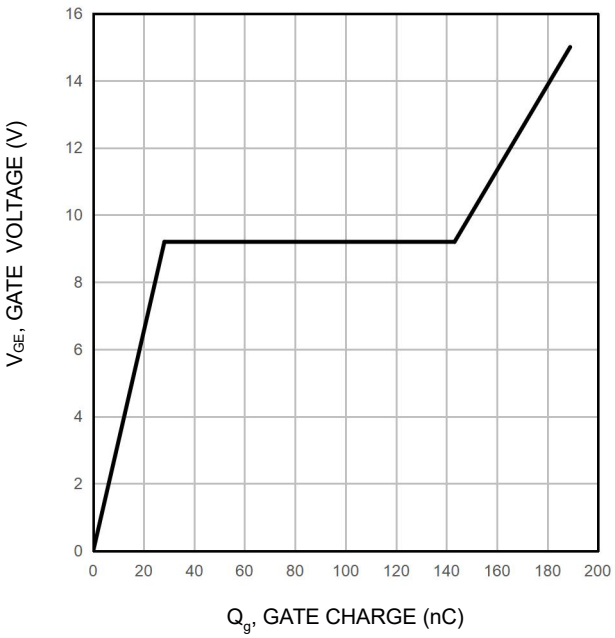


Figure 8.IGBT Transient Thermal Impedance

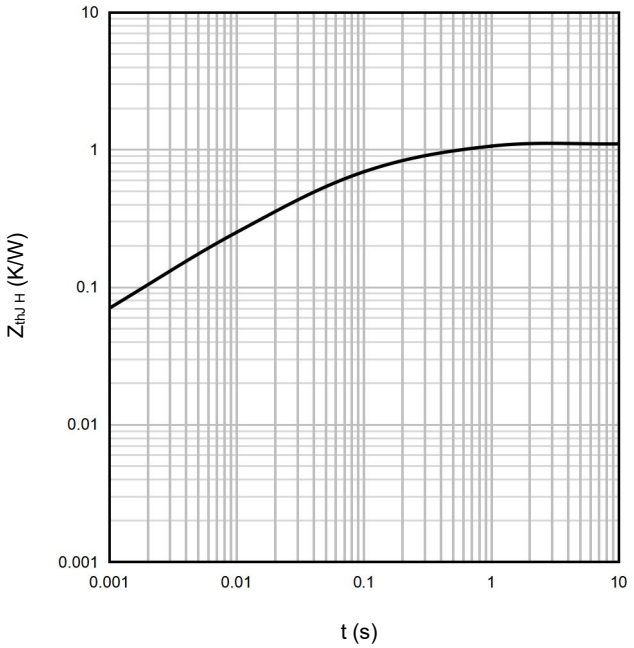


Figure 9.RBSOA IGBT

V_{GE}=±15V,R_G=10Ω,T_{vj}= 150℃

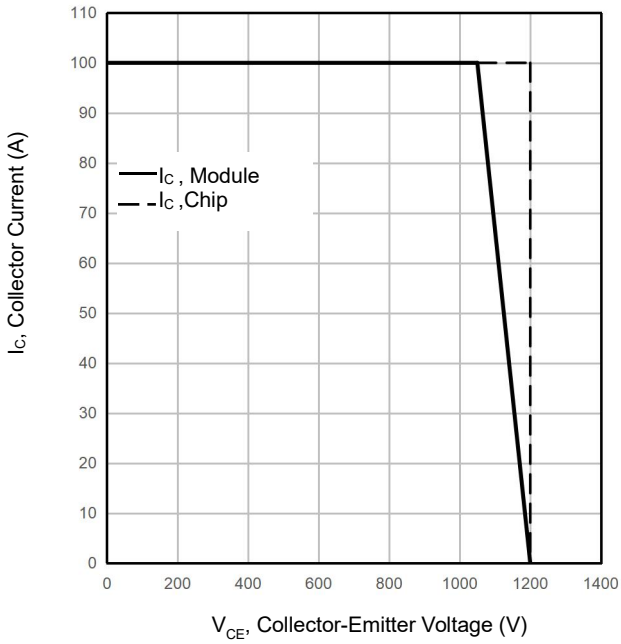


Figure 10.FBSOA IGBT

D=0, Tc=25℃,Tj<=175℃,Vge=15V

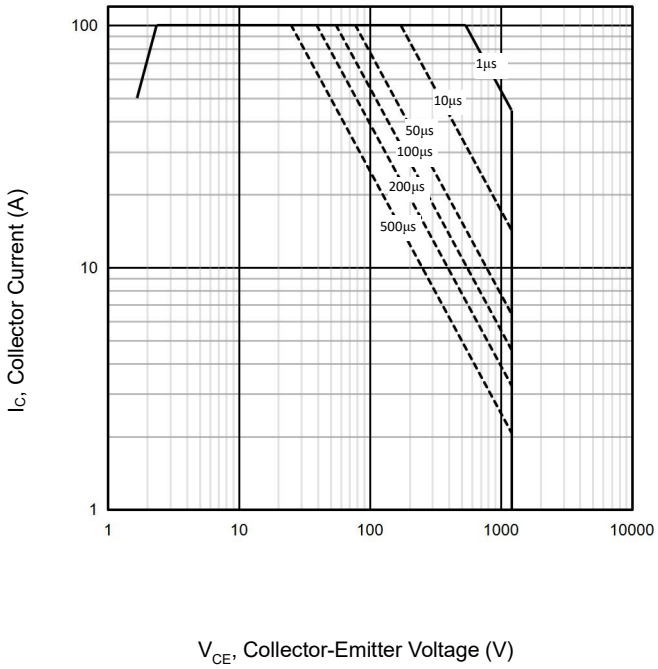


Figure 11.SCSOA IGBT

V_{GE}=±15V,R_G=15Ω,t_P≤10μs,T_{vj}= 150℃

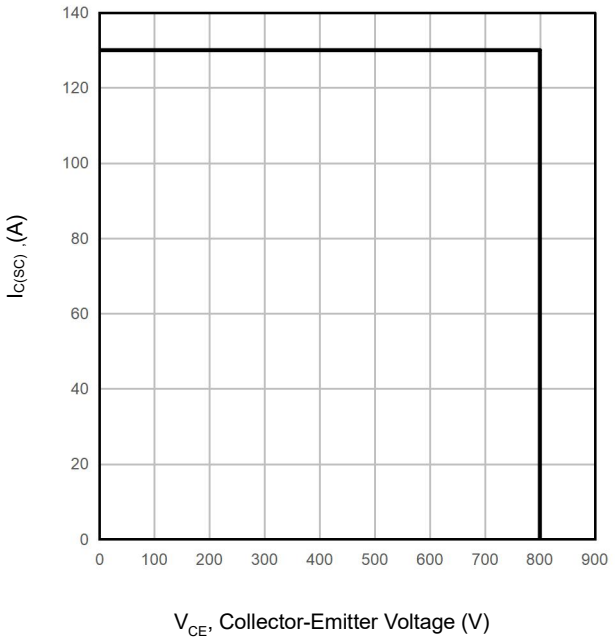


Figure 12.Reverse Recovery Energy Loss vs. IC

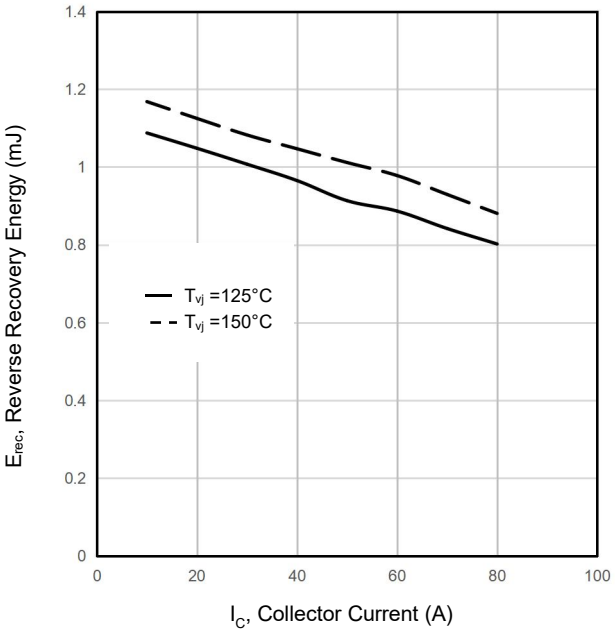


Figure 13.Reverse Recovery Energy Loss vs. R_G

V_{CE}=600V,R_G=10Ω

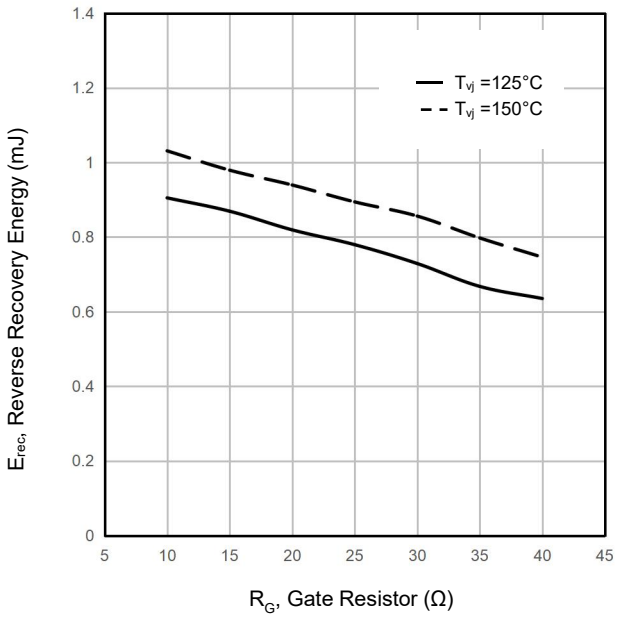


Figure 14.Diode Forward Characteristics

V_{GE}=0V

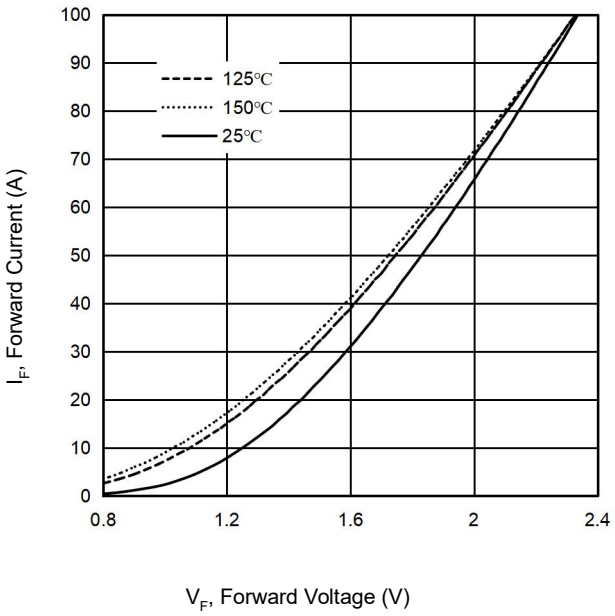


Figure 15.Diode Transient Thermal Impedance

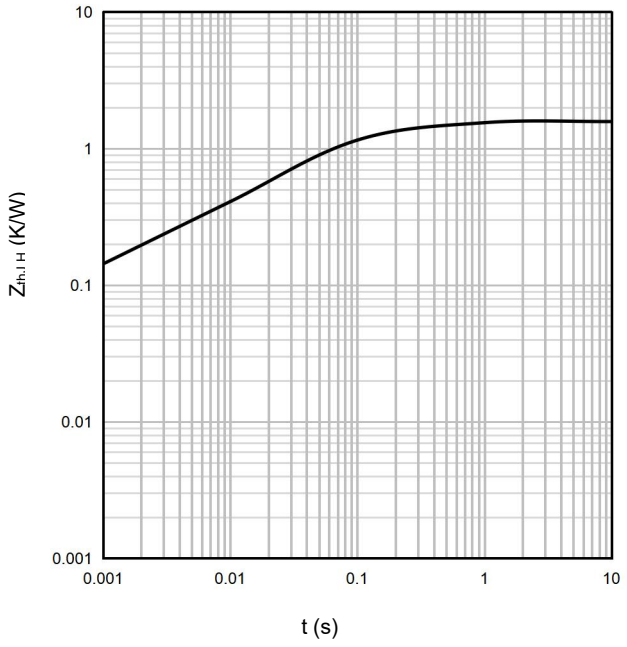
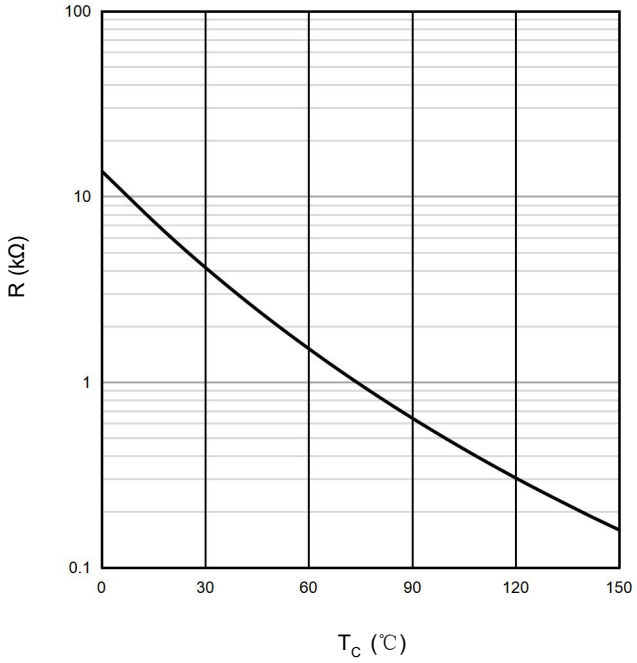
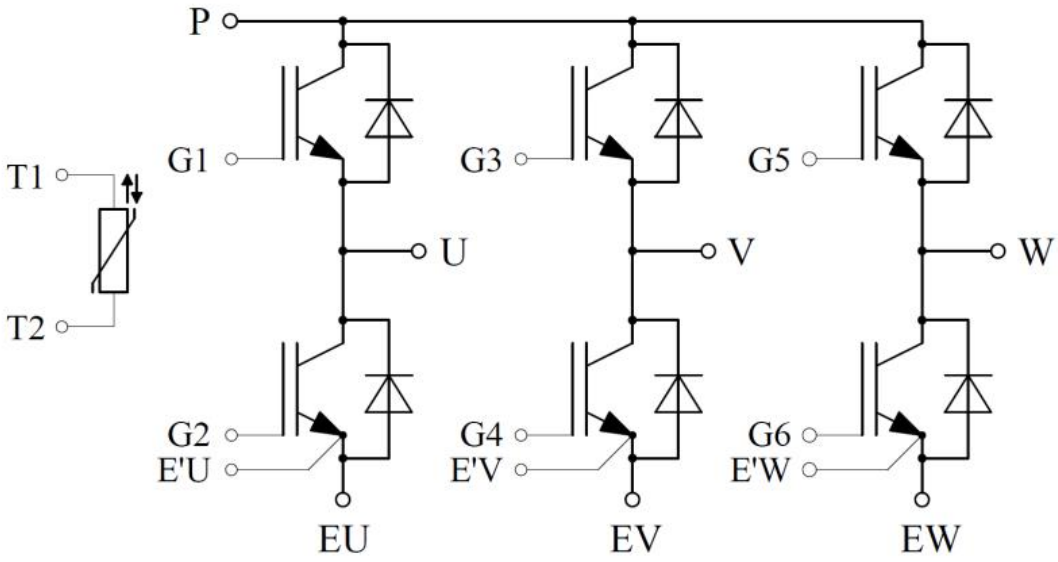


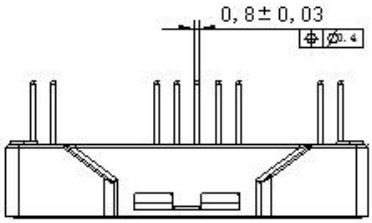
Figure 16.NTC Temperature Characteristic



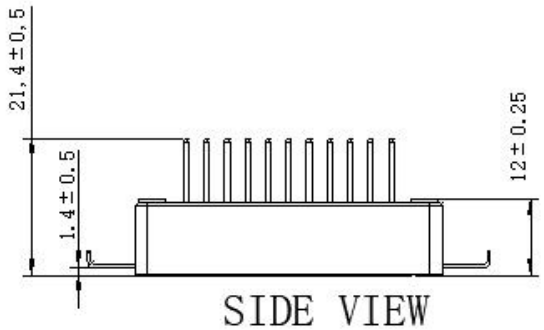
CIRCUIT DIAGRAM



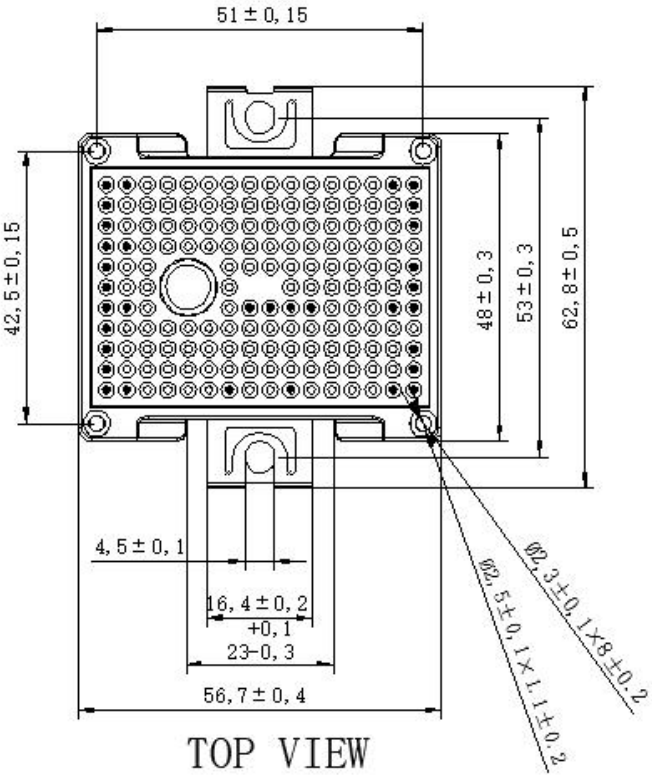
PACKAGE DIMENSION



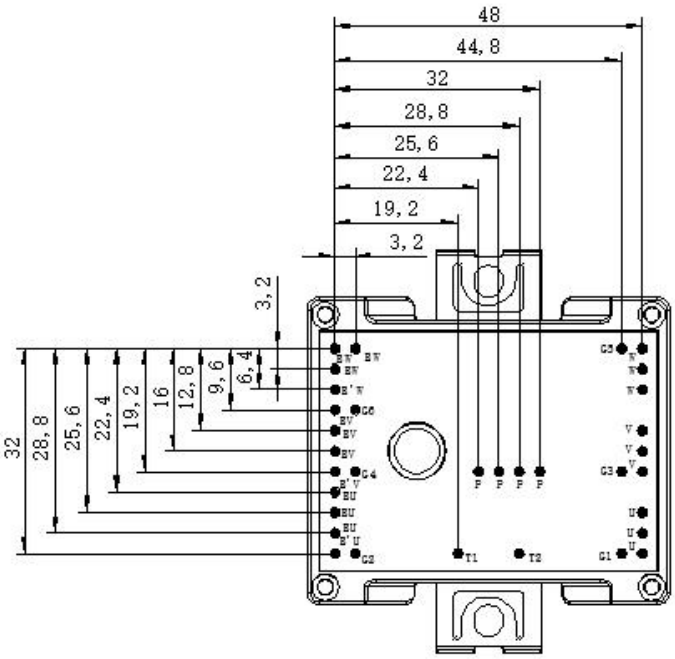
SIDE VIEW



SIDE VIEW



TOP VIEW



REVISION HISTORY

Document version	Date of release	Description of changes
Rev.00	2024-12-11	Preview

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