



SKIF120N65T7P

650V 120A Field Stop Trench IGBT

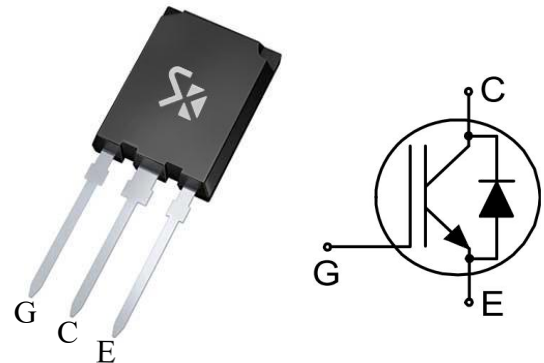
Type	V_{CE}	I_C	$V_{CE(sat)}, T_J=25^{\circ}C$	T_{JMAX}	Package
SKIF120N65T7P	650V	120A	1.4V	175°C	TO-247Puls-3L

Features

- Low $V_{CE(sat)}$ Trench IGBT Technology
- Low Switching Loss
- Maximum Junction Temperature 175°C
- Positive $V_{CE(sat)}$ Temperature Coefficient
- Fast and Soft Reverse Recovery Anti-parallel FWD
- Lead Free, Compliant with RoHS Requirement

Applications

- UPS
- Power Quality
- Inverter for Motor Driver



TO-247Plus-3L

Maximum Ratings ($T_J=25^{\circ}C$ Unless otherwise specified)

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Blocking Voltage	V_{CES}		650	v
Continuous Gate-Emitter Voltage	V_{GES}		± 20	V
Transient Gate-Emitter Voltage			± 30	V
Continuous Collector Current	I_C	$T_C=100^{\circ}C$	120	A
		$T_C=25^{\circ}C$	200	A
Pulse Collector Current, t_p Limited by T_{Jmax}	I_{CM}		240	A
Continuous Forward Current	I_F	$T_C=100^{\circ}C$	120	A
		$T_C=25^{\circ}C$	200	A
Pulse Forward Current, t_p Limited by T_{Jmax}	I_{FM}		240	A
Short Circuit Withstand Time	t_{sc}	$V_{GE}=15V, V_{CE} \leq 400, T_C=150^{\circ}C$	6	μs
Maximum Power Dissipation	P_D	$T_C=25^{\circ}C$	750	W
Junction Temperature	T_J		$-40 \sim +175$	$^{\circ}C$
Operating Junction Temperature	T_{JOP}		$-40 \sim +175$	$^{\circ}C$
Storage Temperature	T_{STG}		$-55 \sim +150$	$^{\circ}C$
Soldering Temperature, for 10 sec	T_S	0.063 in(1.6mm) from case	260	$^{\circ}C$



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Electrical Characteristics of IGBT ($T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test condition		Min	Typ	Max	Units
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=250\mu A$		650			V
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C=2mA, V_{CE}=V_{GE}$		5.0	5.5	6.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sta)}$	$I_C=120A, V_{GE}=15V$	$T_J=25^\circ\text{C}$		1.40	1.80	V
			$T_J=125^\circ\text{C}$		1.65		
			$T_J=150^\circ\text{C}$		1.70		
Collector-Emitter Leakage Current	I_{CES}	$V_{GE}=0V, V_{CE}=650V$				1	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{GE}=\pm 20, V_{CE}=0V$				± 200	nA
Forward Transconductance	g_{FS}	$V_{CE}=20V, I_C=120A$			60		S

Switching Characteristics of IGBT ($T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test condition		Min	Typ	Max	Units
Input Capacitance	C _{ies}	V _{CE} =25V,V _{GE} =0V,f=100kHz			8.14		nF
Output Capacitance	C _{oes}				0.60		nF
Reverse Transfer Capacitance	C _{res}				0.26		nF
Turn-on Delay Time	t _{d(on)}	V _{CC} =400V,I _C =120A, R _{Gon} =4.7Ω,V _{GE} =0V/15V, Inductive Load	T _J =25°C		530		ns
			T _J =125°C		659		ns
			T _J =150°C		762		ns
Rise Time	t _r		T _J =25°C		84		ns
			T _J =125°C		85		ns
			T _J =150°C		85		ns
Turn-off Delay Time	t _{d(off)}		T _J =25°C		464		ns
			T _J =125°C		515		ns
			T _J =150°C		533		ns
Fall Time	t _f	T _J =25°C		122		ns	
		T _J =125°C		133		ns	
		T _J =150°C		134		ns	



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Turn-on Switching Loss	E_{on}	$V_{CC}=400V, I_C=120A,$ $R_{Gon}=4.7\Omega, V_{GE}=0V/15V,$ $di/dt=1130A/\mu s(T_J=150^\circ C),$ Inductive Load	$T_J=25^\circ C$		4.0		mJ
			$T_J=125^\circ C$		5.5		mJ
			$T_J=150^\circ C$		5.8		mJ
Turn-off Switching Loss	E_{off}	$V_{CC}=400V, I_C=120A,$ $R_{Gon}=4.7\Omega, V_{GE}=0V/15V,$ $du/dt=3460V/\mu s(T_J=150^\circ C),$ Inductive Load	$T_J=25^\circ C$		3.5		mJ
			$T_J=125^\circ C$		4.3		mJ
			$T_J=150^\circ C$		4.4		mJ
Total Gate Charge	Q_g	$V_{CC}=520V, I_C=120A, V_{GE}=0V/15V$			533		nC
Gate-Emitter Charge	Q_{ge}				69		nC
Gate-Collector Charge	Q_{gc}				292		nC
Internal Gate Resistance	$R_{G(int)}$	Internal Gate Resistance			0		Ω
Short Circuit Current	I_{SC}	$V_{CC}=400V, V_{GE}=+15V, t_{sc}\leq 6\mu s, T_J=150^\circ C$			570		A

Electrical Characteristics of Diode($T_C=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Test condition		Min	Typ	Max	Units
Diode Forward Voltage	VFM	I _F =120A	T _J =25°C		1.60	2.00	V
			T _J =125°C		1.47		V
			T _J =150°C		1.44		V
Reverse Recovery Time	t _{rr}	I _F =120A,V _{CC} =400V, di/dt=1230A/μs, T _J =150°C	T _J =25°C		83		ns
			T _J =125°C		87		ns
			T _J =150°C		97		ns
Reverse Recovery Charge	Q _{rr}		T _J =25°C		1.50		μC
			T _J =125°C		1.86		μC
			T _J =150°C		2.11		μC
Peak Reverse Recovery Current	I _{rr}		T _J =25°C		27		A
			T _J =125°C		35		A
			T _J =150°C		36		A
Reverse Recovery Energy	E _{rec}		T _J =25°C		0.24		mJ
			T _J =125°C		0.30		mJ
			T _J =150°C		0.31		mJ



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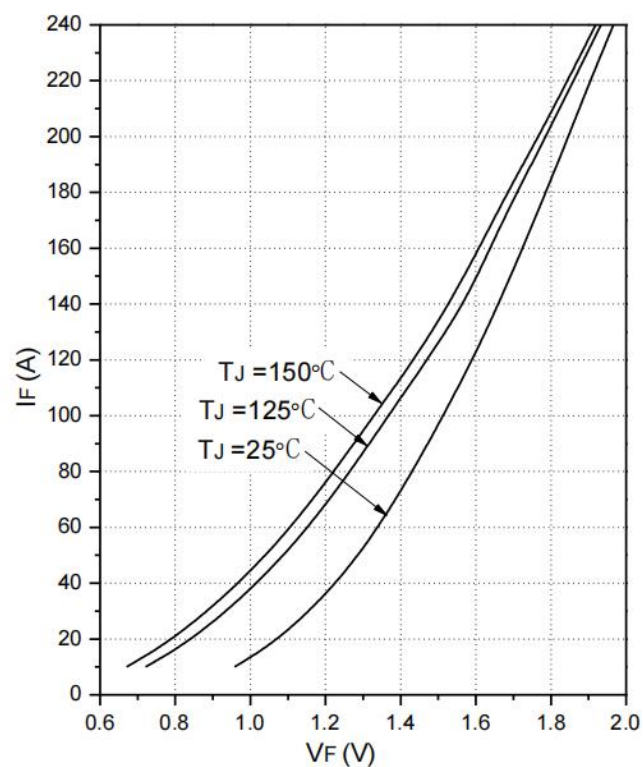
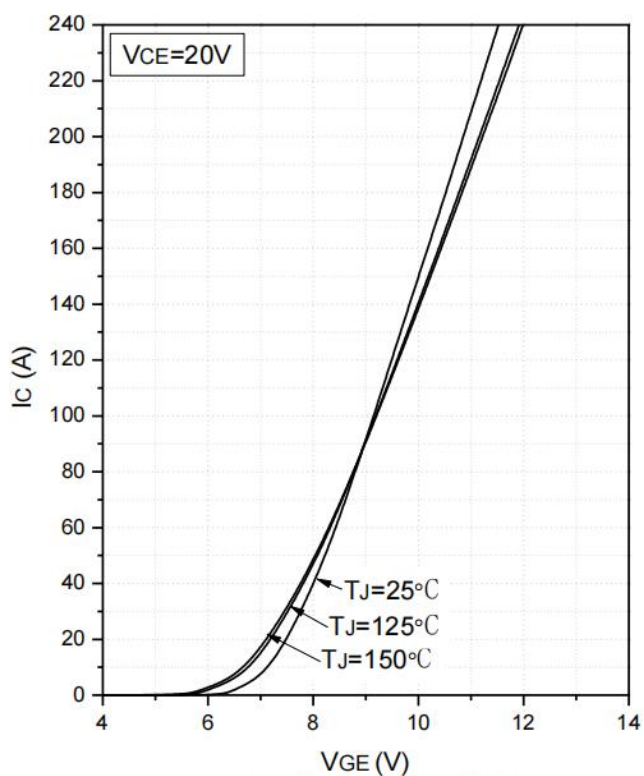
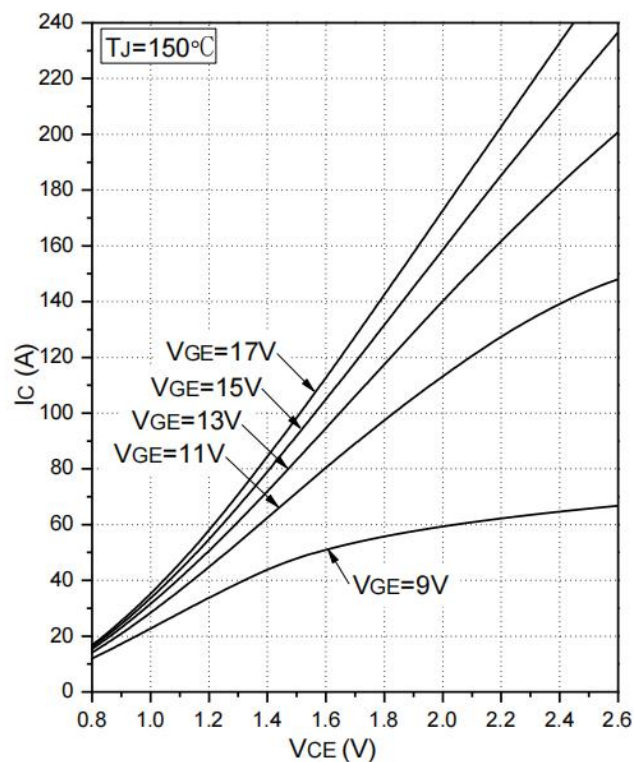
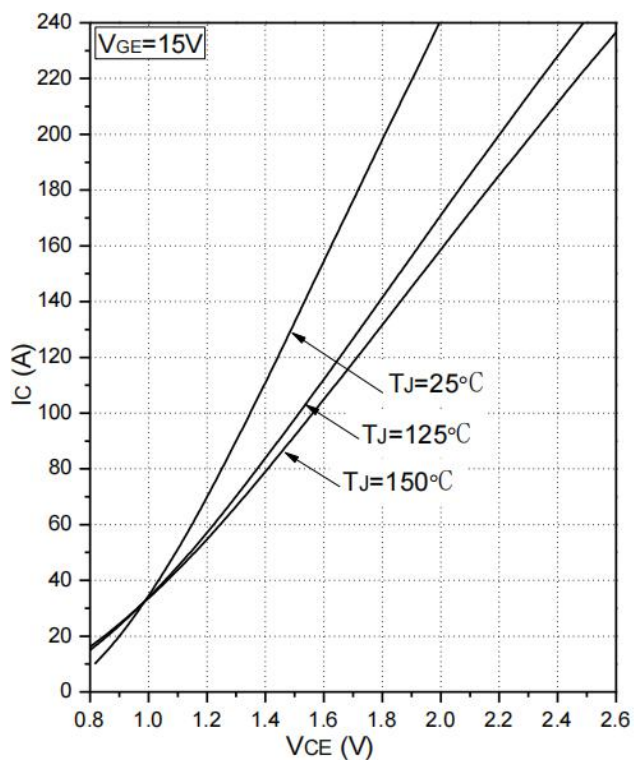
Thermal Characteristics($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance,Junction to Case	$R_{\theta JC(IGBT)}$		0.20		$^{\circ}\text{C}/\text{W}$
Thermal Resistance,Junction to Case	$R_{\theta JC(Diode)}$		0.24		$^{\circ}\text{C}/\text{W}$
Thermal Resistance,Junction to Ambient(Typical Socket Mount)	$R_{\theta JA}$			50	$^{\circ}\text{C}/\text{W}$



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Typical Characteristics





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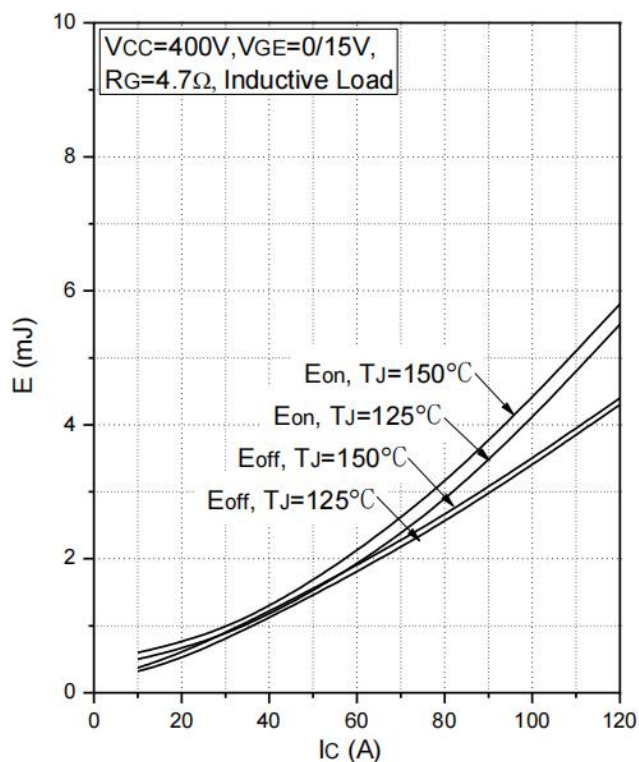


Fig.5 Typical Switching Loss vs. Collector Current

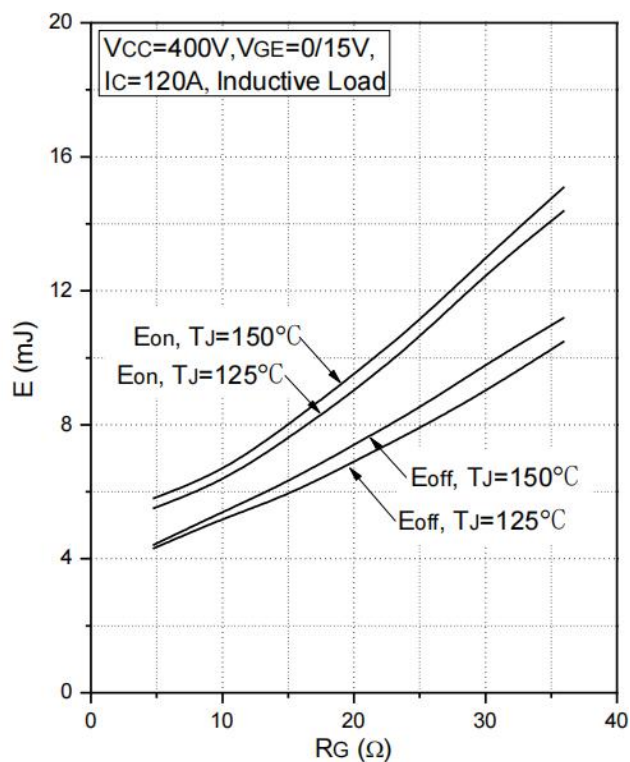


Fig.6 Typical Switching Loss vs. Gate Resistance

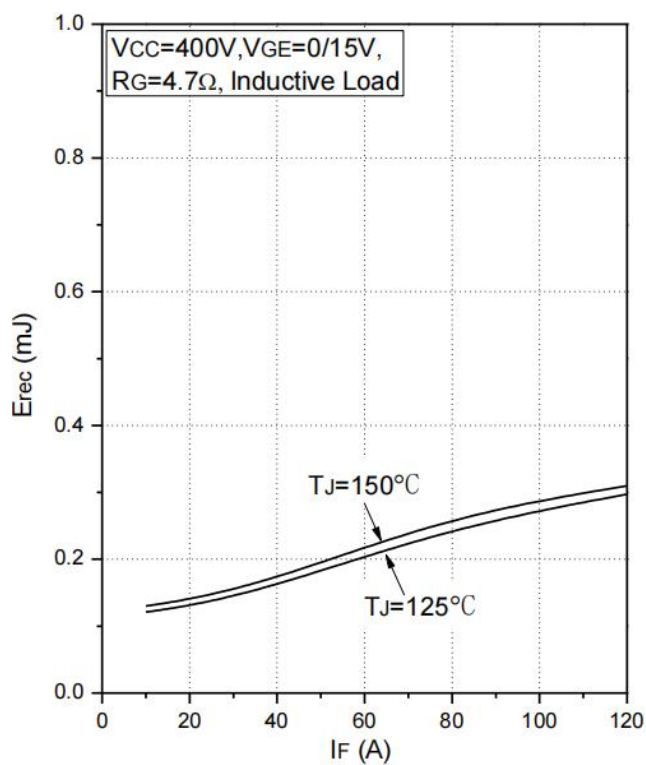


Fig.7 Typical Switching Loss vs. Forward Current

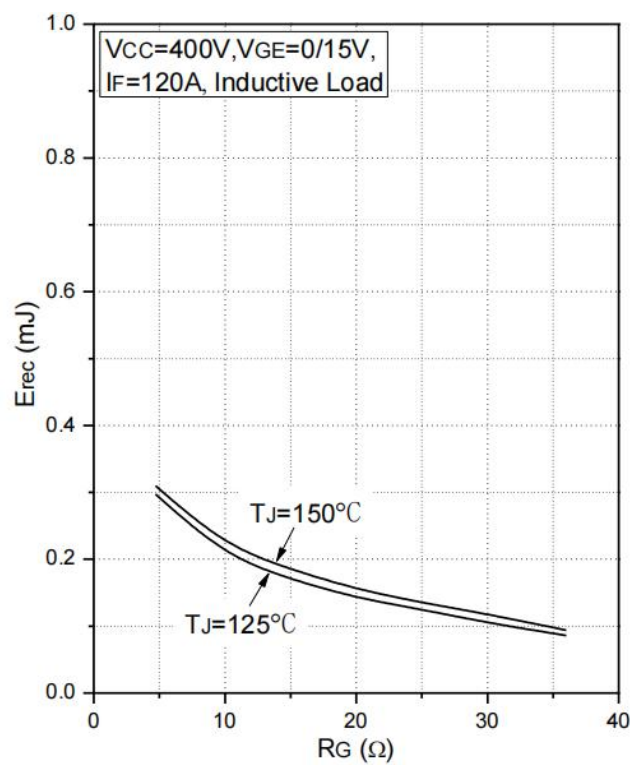


Fig.8 Typical Switching Loss vs. Gate Resistance



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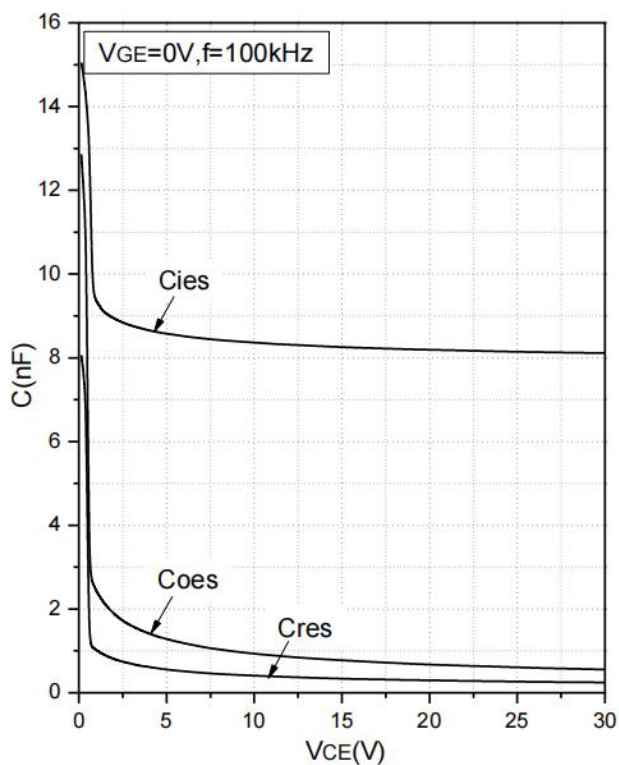


Fig.9 Capacitance Characteristics

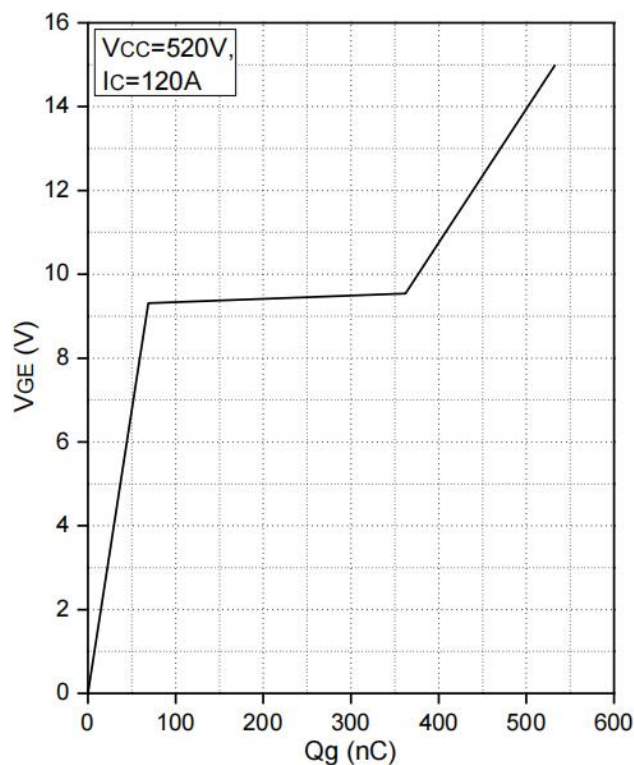


Fig.10 Typ. Gate Charge Characteristics

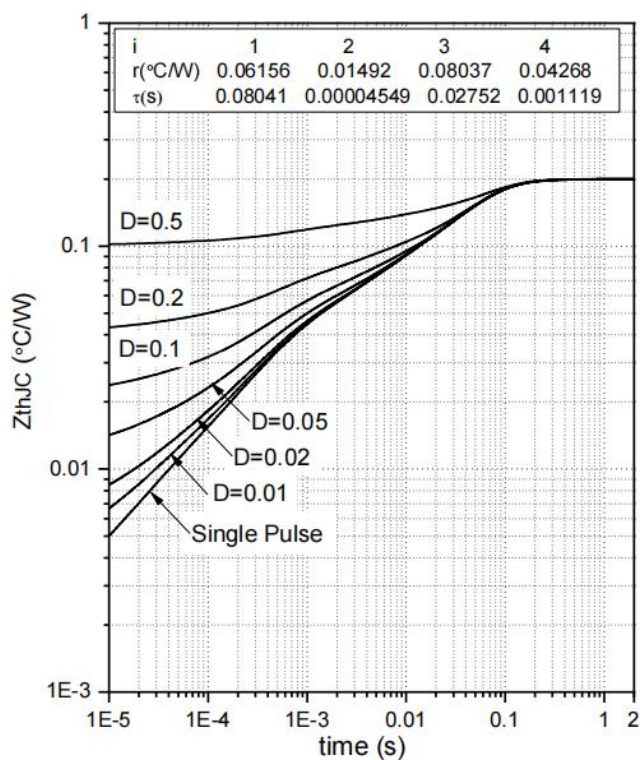


Fig.11 Transient Thermal Impedance (IGBT)

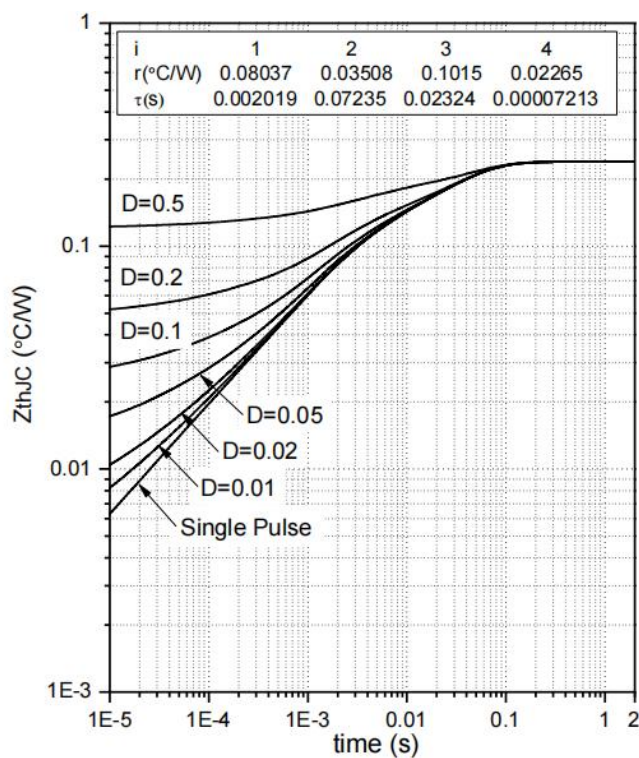


Fig.12 Transient Thermal Impedance (Diode)



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Test Circuit

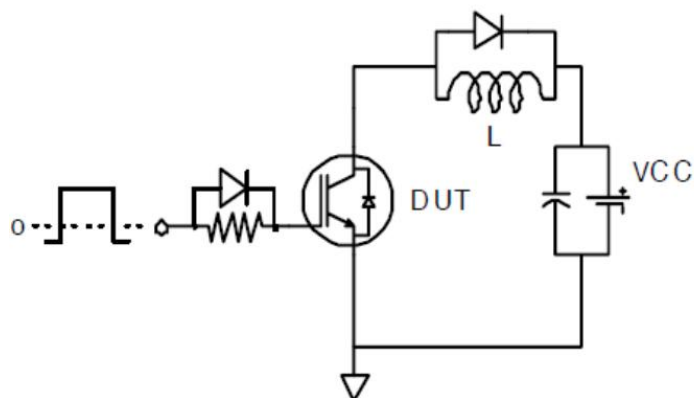


Fig.13 Gate Charge Circuit (turn-off)

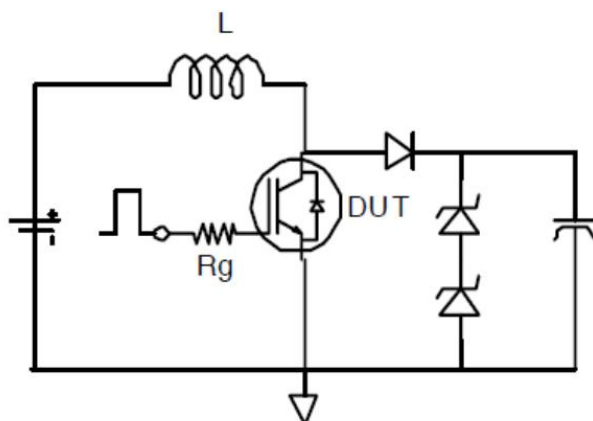


Fig.14 RBSOA Circuit

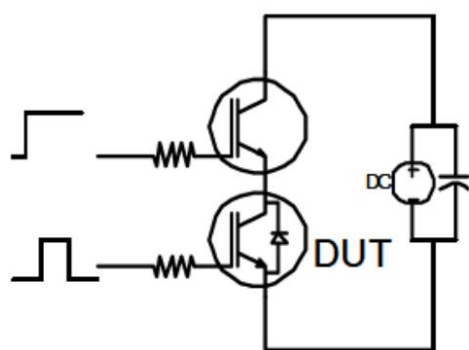


Fig.15 S.C. SOA Circuit

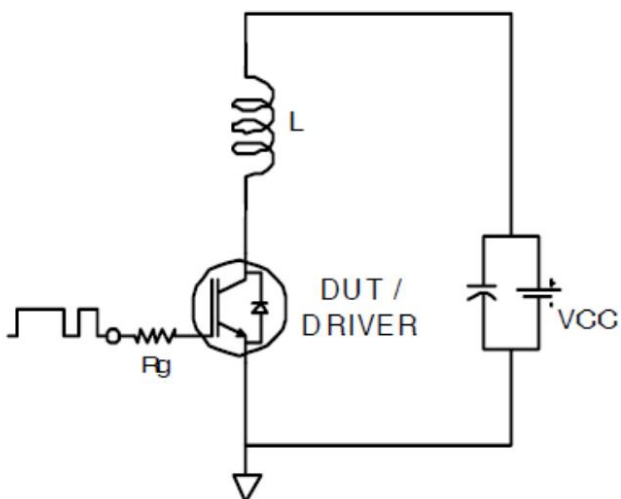


Fig.16 Switching Loss Circuit

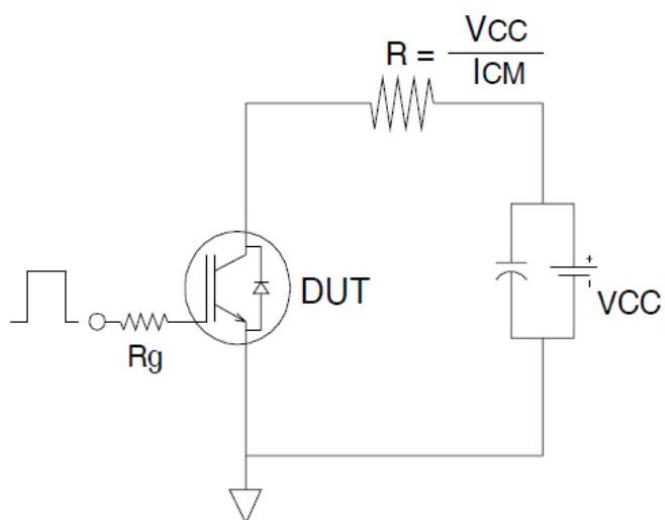


Fig.17 Resistive Load Circuit

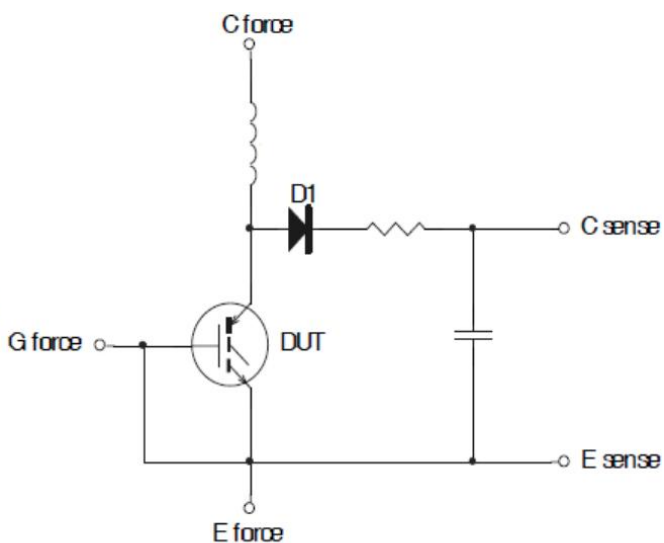


Fig.18 BVCEs Filter Circuit

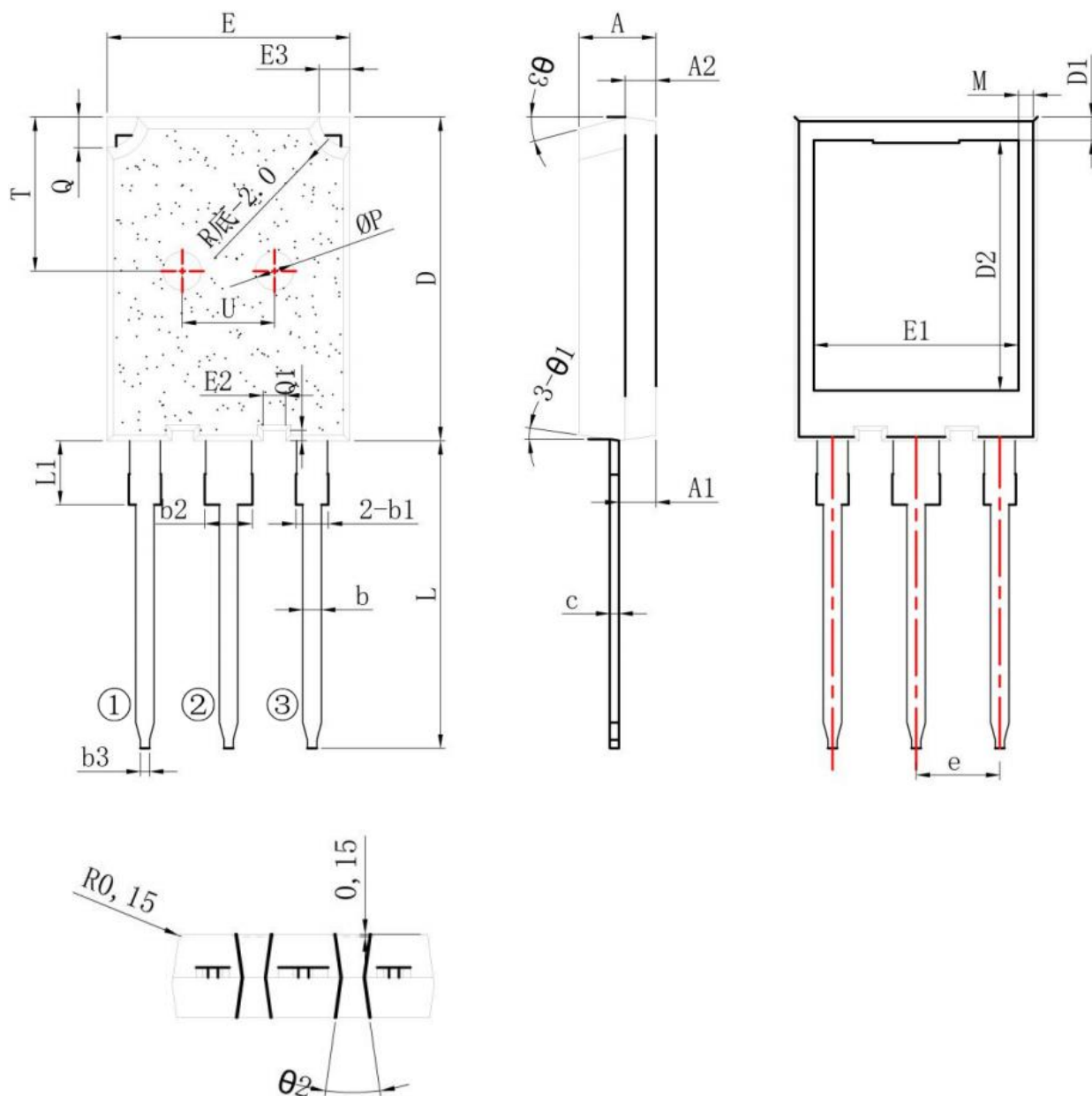


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Package Information

TO-247Plus-3L

Dimensions in mm



Connection

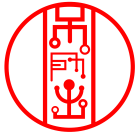
- ① GATE
- ② COLLECTOR
- ③ EMITTER



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Package Mechanical Data:

Symbol	Millimeters		
	Min	Nom	Max
A	4.90	5.00	5.10
A1	2.30	2.40	2.50
A2	1.90	2.00	2.10
b	1.15	1.20	1.25
b1	1.95	2.10	2.25
b2	2.95	3.10	3.25
b3	0.45	0.60	0.75
C	0.55	0.60	0.68
D	20.90	21.00	21.10
D1	1.00	1.20	1.40
D2	16.05	16.35	16.65
E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	1.25	1.45	1.65
E3	1.80	2.00	2.20
e	5.40	5.44	5.48
L	19.80	19.95	20.10
L1	-	-	4.30
M	0.50	0.70	0.90
ΦP	2.30	2.50	2.70
Q	1.80	2.00	2.20
Q1	0.50	0.68	0.80
T	9.80	10.00	10.20
U	5.80	6.00	6.20
θ1	5°	7°	9°
θ2	13°	16°	19°
θ3	13°	15°	17°



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