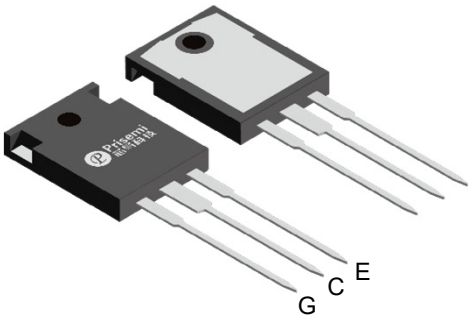
Prisemi®

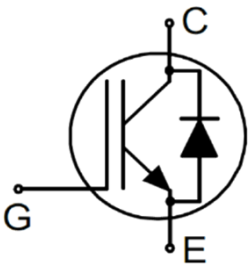
PI75S65T3MA7

Insulate-Gate Bipolar Transistor

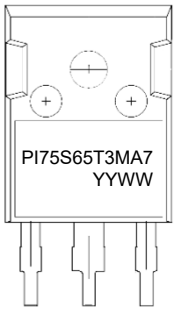
Description



TO-247-3L



Circuit Diagram



Marking (Top View)

Feature

- Ultra-low switching losses
- Benchmark efficiency in hard switching topologies
- Plug-and-play replacement of pure Si-based IGBT
- Internal integrated SiC Schottky Diode (SBD)
- Maximum junction temperature 175℃
- Qualified according to JEDEC
- RoHS compliant

Applications

- Industrial Power Supplies
- Solar String Inverter
- Energy Storage Inverter
- UPS
- DC Charger for Electric Vehicles
- Welding Machines

Absolute maximum rating@25℃

Parameter		Symbol	Value	Units
Collector-Emitter Voltage		V_{CE}	650	V
DC Collector Current (Limited by T_{vjmax})	T_C=25℃	I_C	118	A
	T_C=100℃		75	A
Peak Collector Current (t_p Limited by T_{vjmax})		I_{CM}	500	A
Diode Forward Current (Limited by T_{vjmax})@T_C=100℃		I_F	55	A
Diode Pulse Current (t_p Limited by T_{vjmax})		I_{Fpuls}	210	A
Gate-Emitter Voltage		V_{GE}	±20	V
Power Dissipation	T_C=25℃	P_{tot}	306	W
	T_C=100℃		118	
Operating Junction Temperature		T_{VJ}	-40~+175	℃
Storage Temperature Range		T_{STG}	-55~+150	℃

Thermal Resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
IGBT Thermal Resistance (Junction - Case)	$R_{th(J-C)}$	-	0.49	-	K/W
Diode Thermal Resistance (Junction - Case)	$R_{th(J-C)}$	-	0.63	-	K/W
Thermal Resistance (Junction – Ambient)	$R_{th(J-A)}$	-	43	-	K/W

Electrical characteristics per line@25℃ (unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	V_{GE}=0V, I_C=200μA		650	-	-	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V , I_C=75A	T_{VJ}=25℃	-	1.56	2.1	V
			T_{VJ}=175℃	-	1.97	-	
Diode Forward Voltage	V_F	V_{GE}=0V , I_C=30A	T_{VJ}=25℃	-	1.3	1.6	V
			T_{VJ}=175℃	-	1.56	-	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C=0.75mA, V_{CE}=V_{GE}		3.3	3.8	4.3	V
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=650V, V_{GE}=0V	T_{VJ}=25℃	-	1.0	75	μA
			T_{VJ}=175℃	-	800	-	
Gate-Emitter Leakage Current	I_{GES}	V_{CE}=0V, V_{GE}=20V		-	-	100	nA
Transconductance	g_{fs}	V_{CE}= 20V, I_C= 75A		-	90	-	S
Gate Charge	Q_G	I_C=75A, V_{CE}=520V, V_{GE}=15V		-	191	-	nC
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V, f=250kHz		-	5880	-	pF
Output Capacitance	C_{oes}			-	508	-	
Reverse Transfer Capacitance	C_{res}			-	48	-	
Turn-on Delay Time	$t_{d(on)}$	I_C=75A, V_{CE}=400V, V_{GE}=0/15V, R_{Gon}=8Ω, R_{Goff}=8Ω, Inductive Load	T_{VJ}=25℃	-	24	-	ns
			T_{VJ}=150℃	-	31	-	
Rise Time	t_r		T_{VJ}=25℃	-	32	-	
			T_{VJ}=150℃	-	33	-	
Turn-off Delay Time	$t_{d(off)}$		T_{VJ}=25℃	-	183	-	
			T_{VJ}=150℃	-	194	-	
Fall Time	t_f		T_{VJ}=25℃	-	34	-	
			T_{VJ}=150℃	-	38	-	
Turn-on Energy	E_{on}	I_C=75A, V_{CE}=400V, V_{GE}=0/15V, R_{Gon}=8Ω, R_{Goff}=8Ω, Inductive Load	T_{VJ}=25℃	-	1.74	-	mJ
			T_{VJ}=150℃	-	2.61	-	
Turn-off Energy	E_{off}		T_{VJ}=25℃	-	0.91	-	
			T_{VJ}=150℃	-	1.02	-	
Total Switching Energy	E_{ts}		T_{VJ}=25℃	-	2.65	-	
			T_{VJ}=150℃	-	3.63	-	

Typical Characteristics

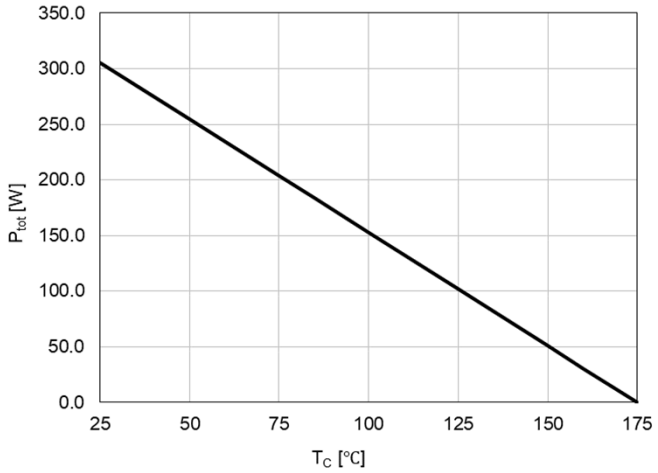


Fig 1. Power dissipation as a function of case temperature (Tj≤ 175°C)

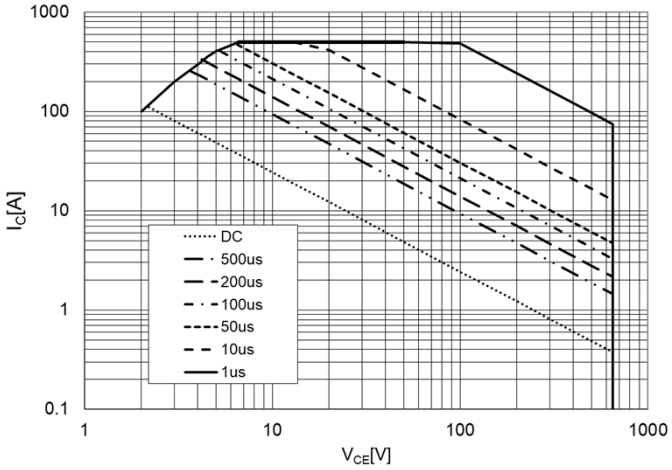


Fig 2. Forward bias safe operating area (D = 0, TC= 25°C, Tj≤ 175°C, VGE= 15V)

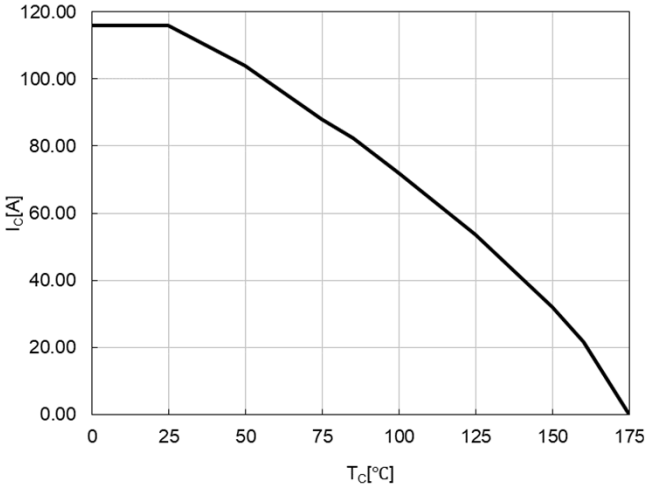


Fig 3. Collector current as a function of case temperature (VGE≥ 15V,Tj≤ 175°C)

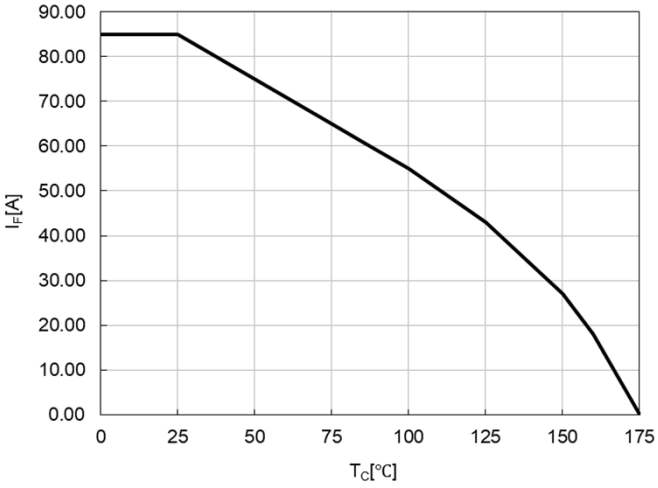


Fig 4. Diode Forward current as a function of case temperature

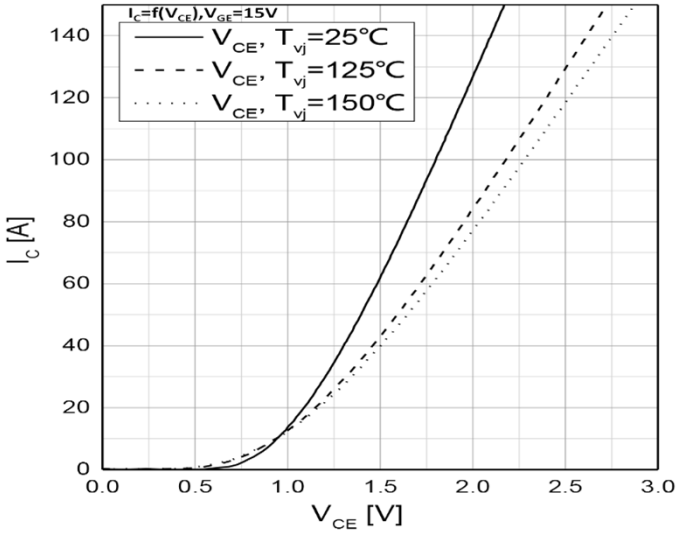


Fig 5.Output Characteristic IGBT(I)

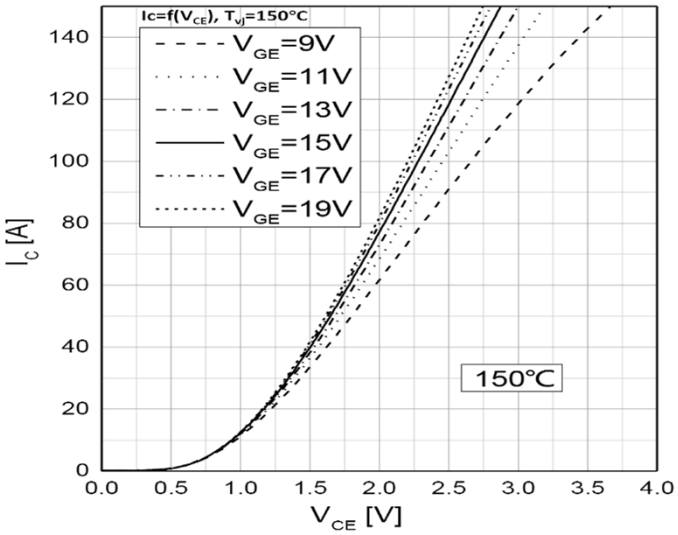


Fig 6.Output Characteristic IGBT(II)

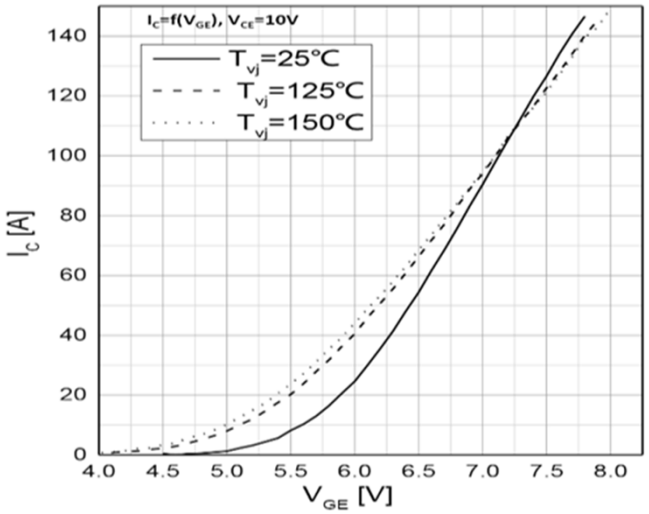


Fig 7. Transfer Characteristic IGBT

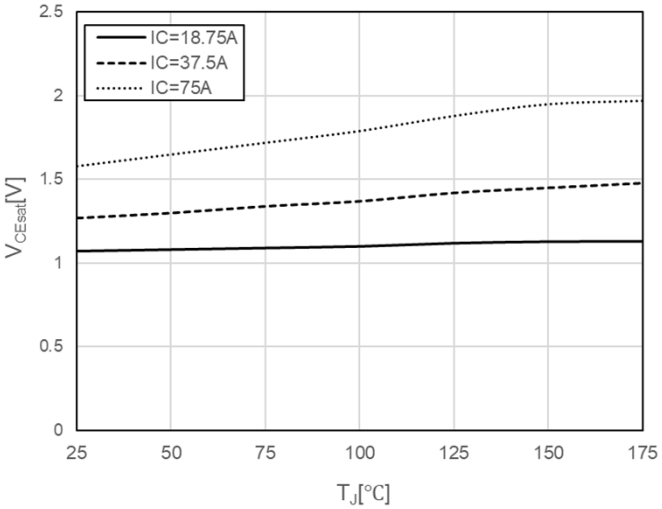


Fig 8.Typical collector-emitter saturation voltage as junction temperature (V_{GE}=15V)

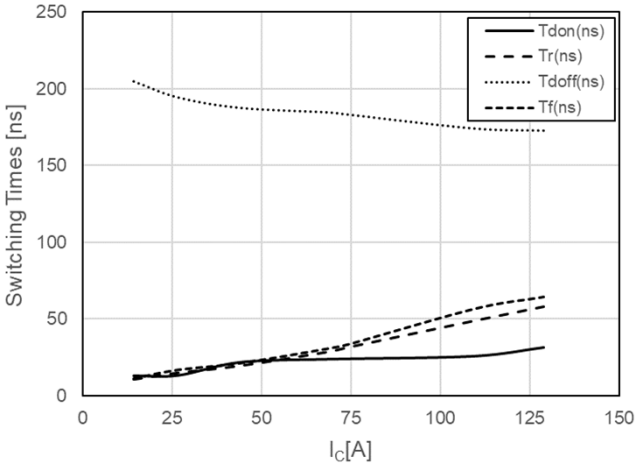


Fig 9. Typical switching times as collector current
(Tj= 25°C, VCE= 400V, VGE= 15/0V)

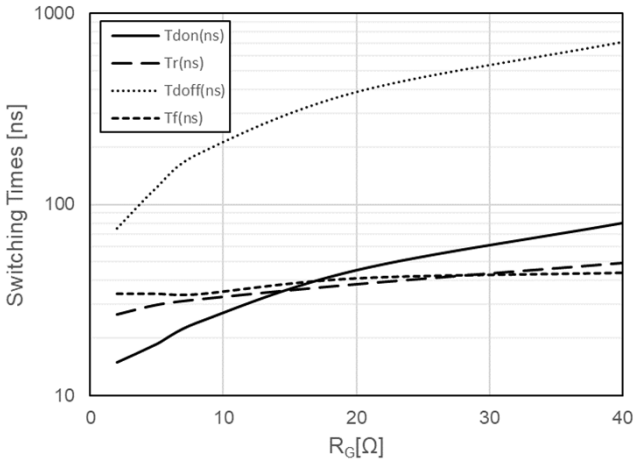


Fig 10. Typical switching times as gate Resistor
(Tj= 25°C, VCE=400V, VGE= 15/0V, IC =75A)

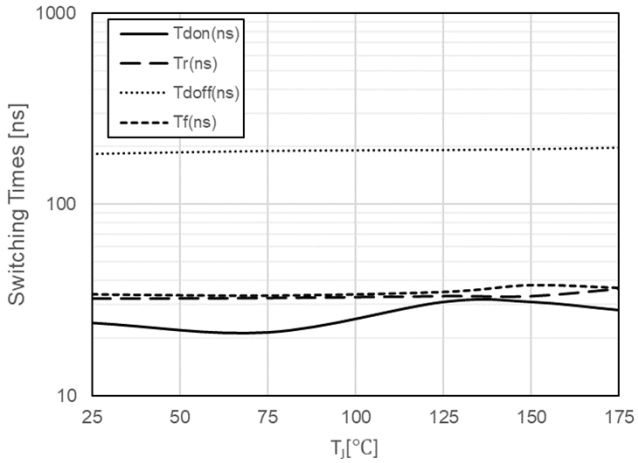


Fig 11. Typical switching times as junction temperature
(VCE= 400V, VGE= 15/0V, IC = 75A)

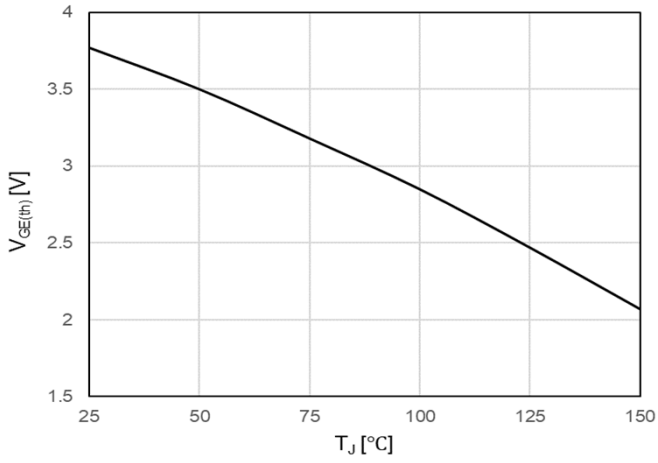


Fig 12. Gate-emitter threshold voltage as junction temperature (IC=0.75mA)

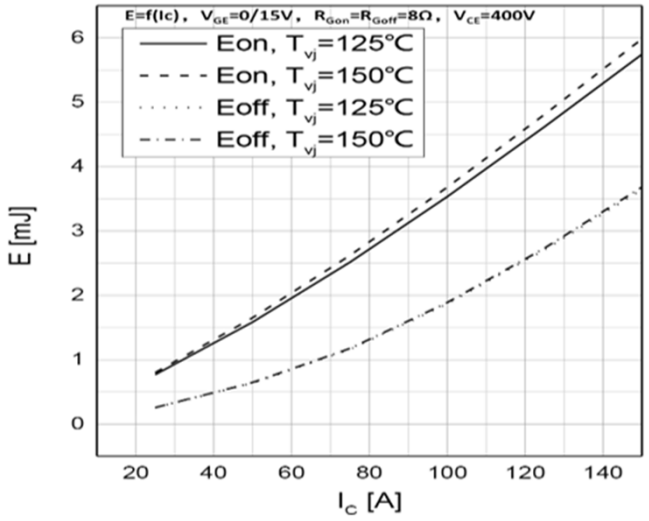


Fig 13. Switching Losses IGBT(I)

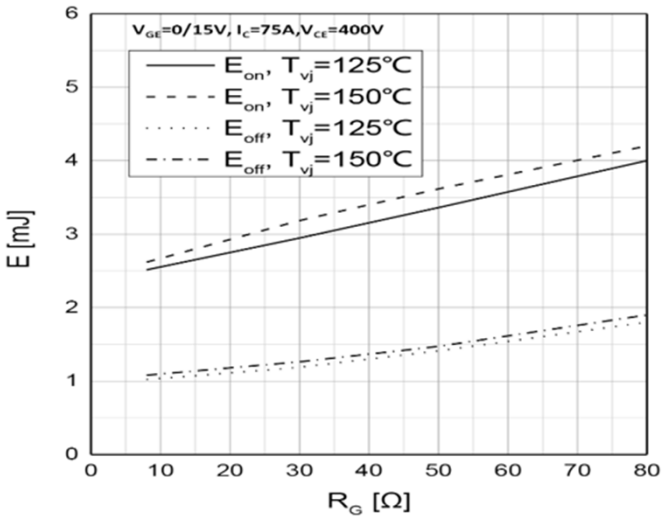


Fig 14. Switching Losses IGBT(II)

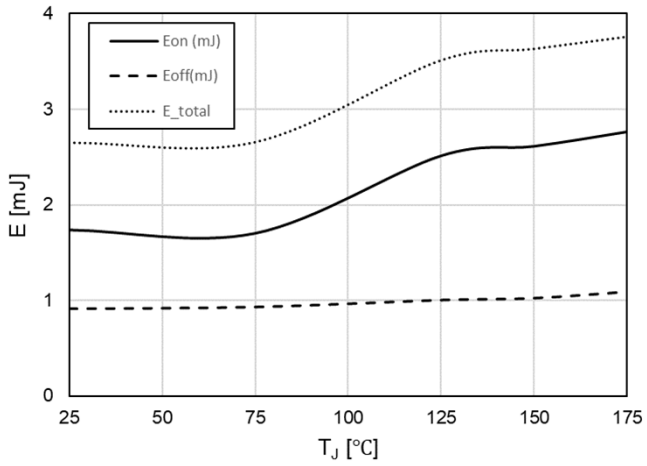


Fig 15. Typical switching energy losses as a function of junction temperature
(Inductive load, VCE= 400V, VGE= 15/0V, IC = 75A)

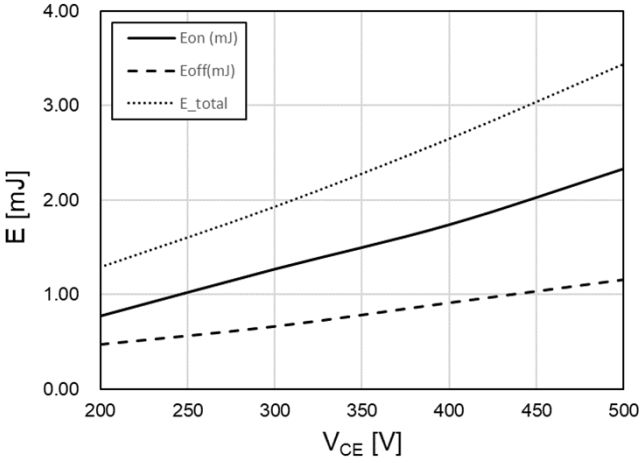


Fig 16. Typical switching energy losses as a function of collector emitter voltage
(Inductive load, Tj= 25°C, VGE= 15/0V, IC = 75A)

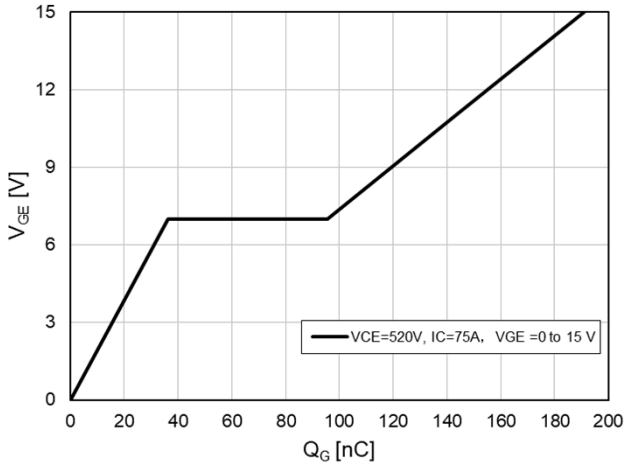


Fig.17. Typical gate charge

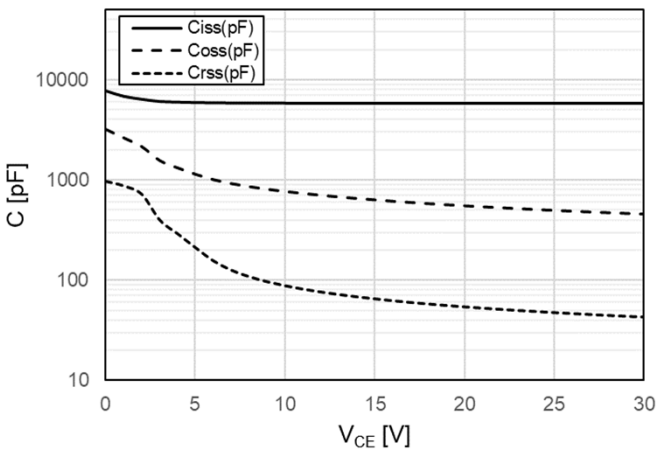


Fig.18. Typical capacitance as a function of collector-emitter voltage
(VGE = 0V,f = 250KHz)

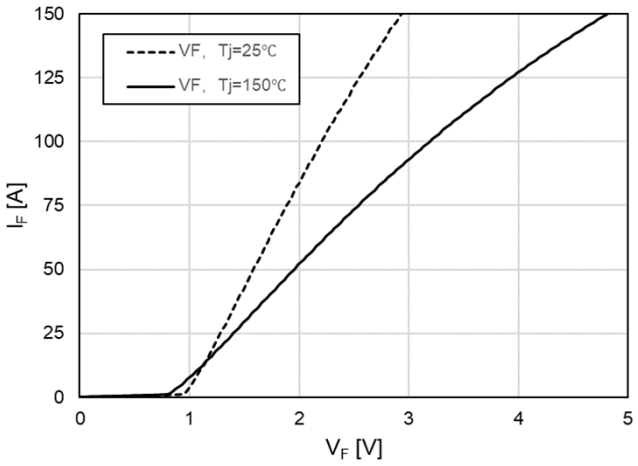


Fig 19. Forward Characteristic Diode

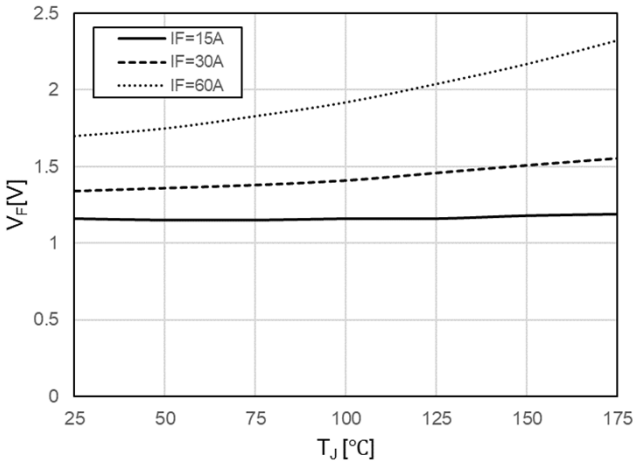


Fig 20. Typical diode forward voltage as a function of junction temperature

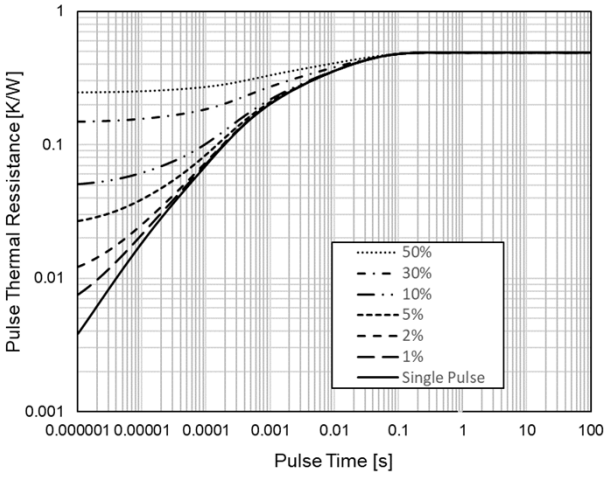


Fig 21. Transient Thermal Impedance IGBT

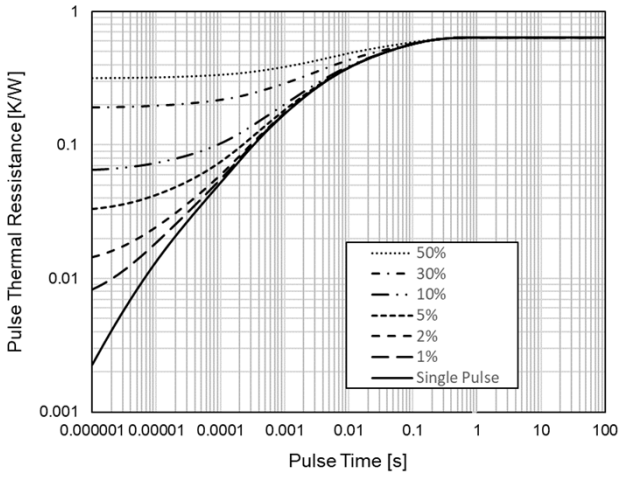
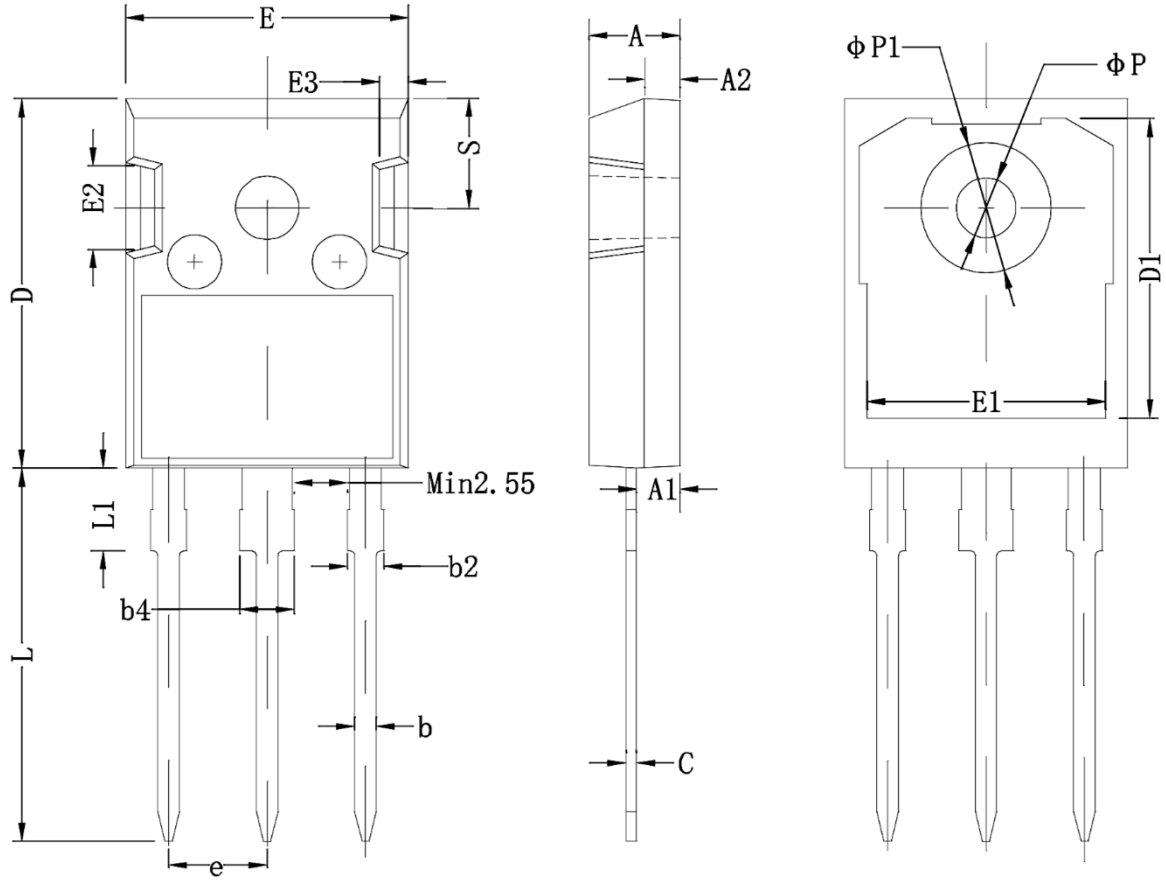


Fig 22. Transient Thermal Impedance Diode

Product Dimension (TO-247-3L)



Dim	Millimeters		Inches		Dim	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	4.80	5.20	0.189	0.205	E1	13.00	13.60	0.512	0.535
A1	2.21	2.59	0.087	0.102	E2	4.80	5.20	0.189	0.205
A2	1.85	2.15	0.073	0.085	E3	2.30	2.70	0.091	0.106
b	1.11	1.36	0.044	0.054	e	5.44 BSC.		0.214 BSC.	
b2	1.91	2.21	0.075	0.087	L	19.82	20.22	0.780	0.796
b4	2.91	3.21	0.115	0.126	L1	-	4.30	-	0.169
c	0.51	0.75	0.020	0.030	φP	3.40	3.80	0.134	0.150
D	20.80	21.30	0.819	0.839	φP1	-	7.30	-	0.287
D1	16.25	16.85	0.640	0.663	S	6.15 BSC.		0.242 BSC.	
E	15.50	16.10	0.610	0.634					

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