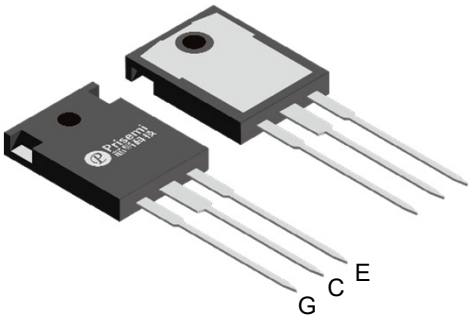
Prisemi®

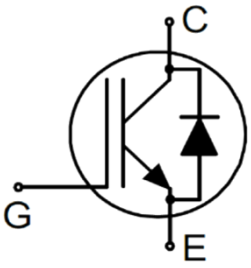
PI75S120T3NA7

Insulate-Gate Bipolar Transistor

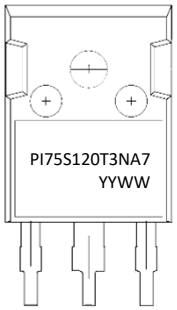
Description



TO-247-3L



Circuit Diagram



Marking (Top View)

Feature

- Low switching power loss
- Low switching surge and noise
- Advanced Field Stop technology
- Low EMI
- Maximum junction temperature 175°C
- Qualified according to JEDEC for target applications
- Pb-free lead plating, halogen-free mold compound, RoHS compliant
- Internal integrated SiC Schottky Diode (SBD)

Applications

- Industrial UPS
- Welding machine
- Solar converters
- Energy Storage
- EV Charger

Absolute maximum rating@25℃

Parameter		Symbol	Value	Units
Collector-Emitter Voltage		V_{CES}	1200	V
Gate-Emitter Voltage		V_{GES}	±20	V
Transient Gate-emitter Voltage (t_p≤10μs, D<0.010)			±30	
Collector Current	T_c= 25℃	I_C	150	A
	T_c= 100℃		75	
Pulsed Collector Current		I_{CM}	300	A
Diode Current	T_c= 100℃	I_F	30	A
Diode Pulsed Current		I_{FM}	230	A
Power Dissipation		P_D	638	W
Operating Junction Temperature		T_J	-40~+175	℃
Storage Temperature		T_{STG}	-55~+150	℃

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Collector-Emitter Breakdown Voltage	BV_{CE}	V_{GE}=0V, I_C=250μA		1200	-	-	V
C-E Leakage Current	I_{CES}	V_{CE}=1200V, V_{GE}=0V		-	-	400	μA
G-E Leakage Current	I_{GES}	V_{GE}=±20V, V_{CE}=0V		-	-	±600	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C=250μA, V_{CE}=V_{GE}		4.3	5.3	6.4	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=75A, V_{GE}=15V	T_C=25℃	-	1.9	2.5	V
			T_C=175℃	-	2.47	-	
Transconductance	g_{fs}	V_{CE}= 20V, I_C= 75A		-	90	-	S
Input Capacitance	C_{ies}	V_{CE}=30V,V_{GE}=0V, f=1MHz		-	7300	-	pF
Output Capacitance	C_{oes}			-	175	-	
Reverse Transfer Capacitance	C_{res}			-	23	-	
Diode Forward Voltage	V_{FM}	I_F=30A	T_C=25℃	-	1.45	2.2	V
			T_C=175℃	-	2.15	-	
Diode Capacitive Charge	Q_C	V_R=800V, T_j=25°C		-	115	-	nC
Diode Capacitance	C	V_R=1V, f=1MHz		-	1690	-	pF
		V_R=400V, f=1MHz		-	146	-	
		V_R=800V, f=1MHz		-	113	-	
Turn-on Delay Time	$t_{d(on)}$	I_C=75A V_{CC}=600V V_{GE}=15V R_G=10Ω Inductive Load	T_{VJ}=25℃	-	62	-	ns
			T_{VJ}=150℃	-	57	-	
Rise Time	t_r		T_{VJ}=25℃	-	94	-	
			T_{VJ}=150℃	-	91	-	
Turn-off Delay Time	$t_{d(off)}$		T_{VJ}=25℃	-	238	-	
			T_{VJ}=150℃	-	294	-	
Fall Time	t_f		T_{VJ}=25℃	-	68	-	
			T_{VJ}=150℃	-	94	-	
Turn-on Energy Loss	E_{on}	I_C=75A V_{CC}=600V V_{GE}=15V R_G=10Ω Inductive Load	T_{VJ}=25℃	-	4.64	-	mJ
			T_{VJ}=150℃	-	4.44	-	
Turn-off Energy Loss	E_{off}		T_{VJ}=25℃	-	2.52	-	
			T_{VJ}=150℃	-	3.44	-	
Total Switching Loss	E_{st}		T_{VJ}=25℃	-	7.16	-	
			T_{VJ}=150℃	-	7.88	-	
Total Gate Charge	Q_g	V_{CE}=600V, V_{GE}=15V, I_C=75A		-	234	-	nC
Gate to Emitter Charge	Q_{ge}			-	67	-	
Gate to Collector Charge	Q_{gc}			-	68	-	

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Peak reverse recovery current	I_{RM}	I_F=30A V_R=600V V_{GE}=0V Inductive Load	T_{VJ}=25℃	-	10.1	-	A
			T_{VJ}=150℃	-	9.0	-	
Reverse recovery charge	Q_{rr}	I_F=30A V_R=600V V_{GE}=0V Inductive Load	T_{VJ}=25℃	-	175	-	nC
			T_{VJ}=150℃	-	167	-	
Reverse Recovery Time	T_{rr}	I_F=30A V_R=600V V_{GE}=0V Inductive Load	T_{VJ}=25℃	-	38.4	-	ns
			T_{VJ}=150℃	-	38.4	-	
Reverse recovery energy loss	E_{rec}	I_F=30A V_R=600V V_{GE}=0V Inductive Load	T_{VJ}=25℃	-	0.053	-	mJ
			T_{VJ}=150℃	-	0.050	-	

Thermal Resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, IGBT Junction-Ambient	$R_{th(J-A)}$	-	-	40	℃/W
Thermal Resistance, IGBT Junction to Case	$R_{th(J-C)}$	-	-	0.18	℃/W
Thermal Resistance, FRD Junction to Case	$R_{th(J-C)}$	-	-	0.28	℃/W

Typical Characteristics

Figure 1. Typical Output Characteristics

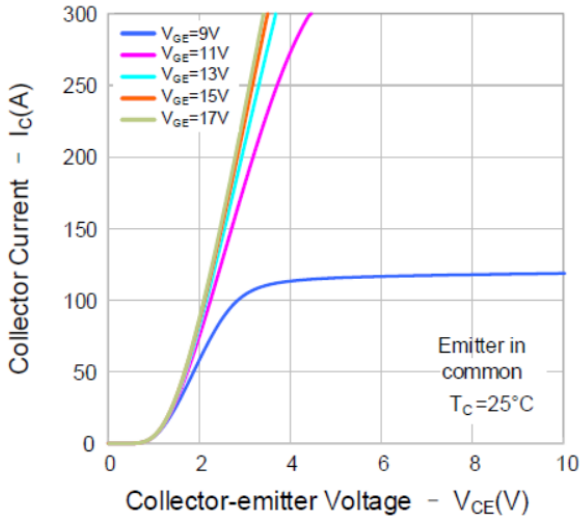


Figure 2. Typical Output Characteristics

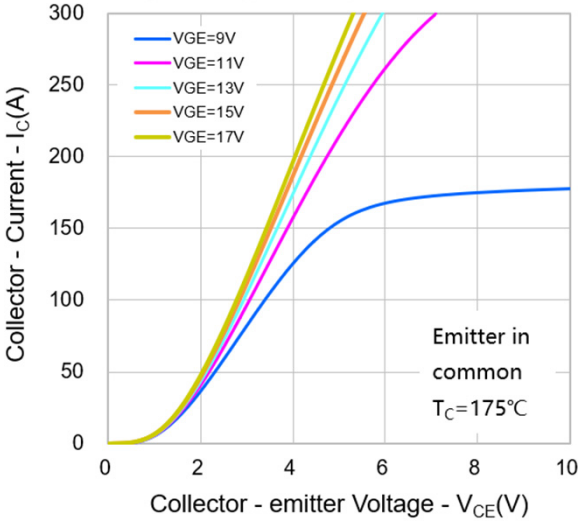


Figure 3. Typical Saturation Voltage Characteristics

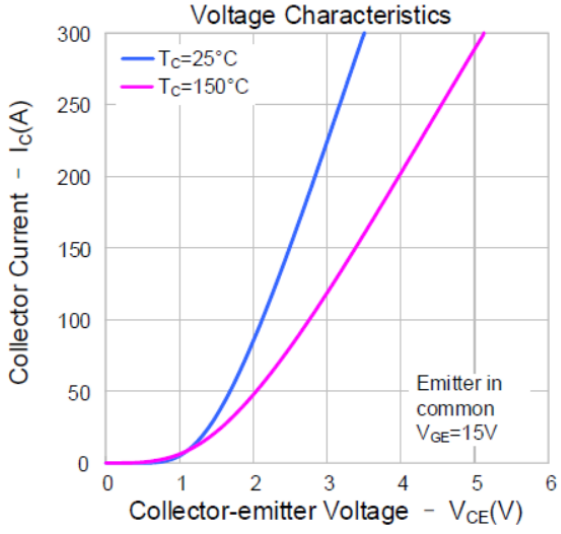


Figure 4.Transmission Characteristics

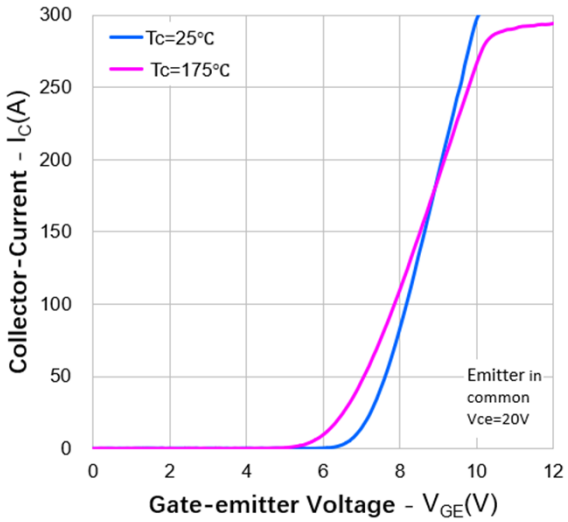


Figure 5. Saturation Voltage Drop vs. V_{GE}

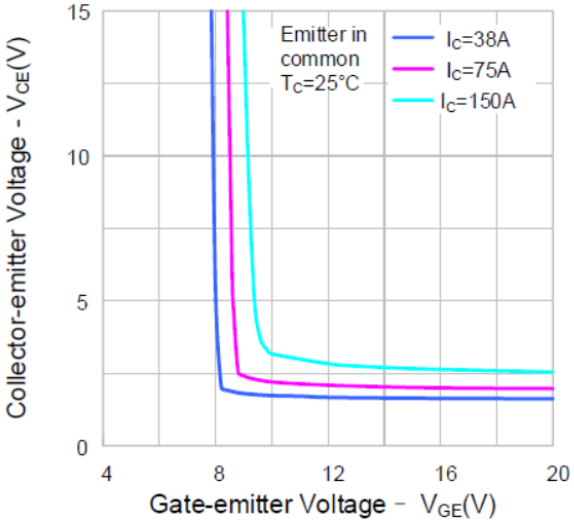


Figure 6. Saturation Voltage Drop vs. V_{GE}

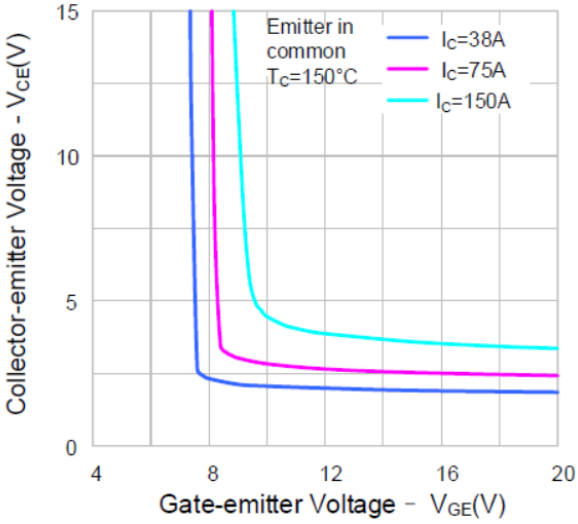


Figure 7.Saturation Voltage Drop vs Temperature

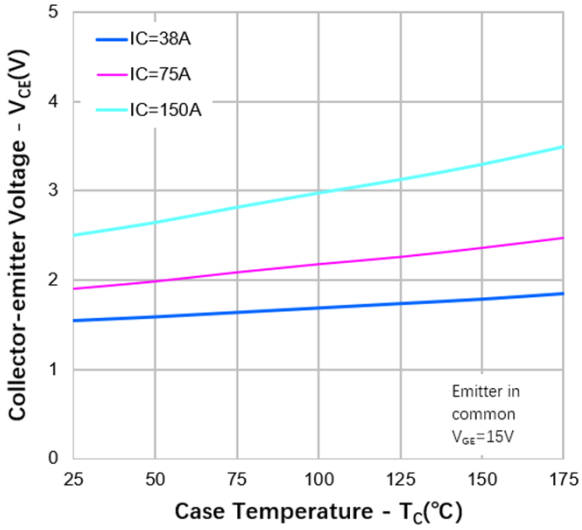


Figure 8. Capacitance Characteristics

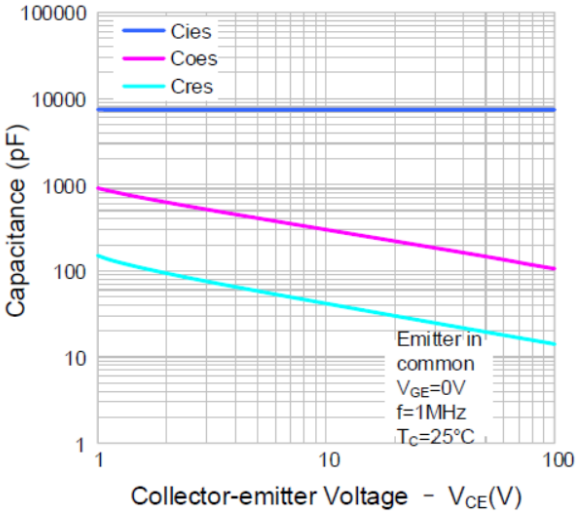


Figure 9. Gate Charge Characteristics

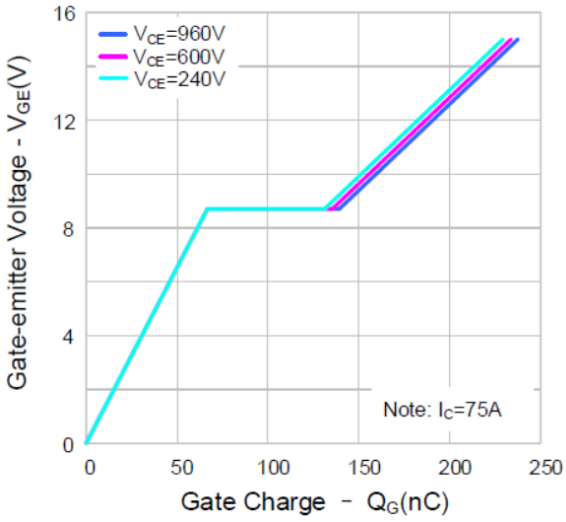


Figure 10.Forward Characteristics

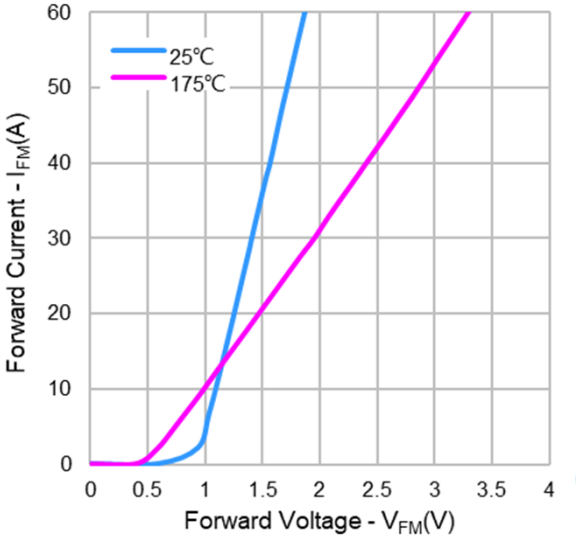


Figure 11.Turn-on Characteristics vs.Gate Resistance

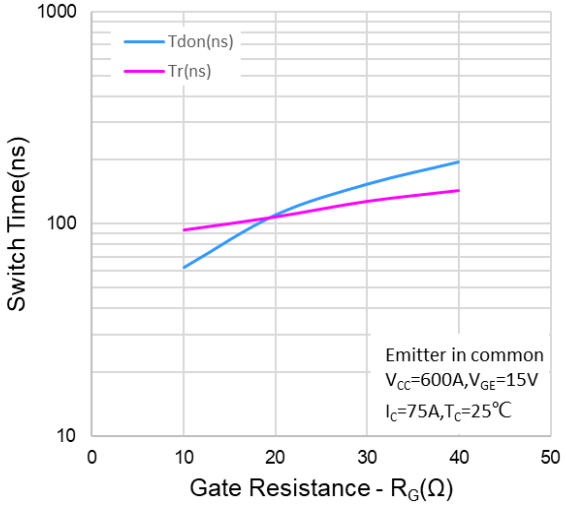


Figure 12.Turn-on Characteristics vs.Gate Resistance

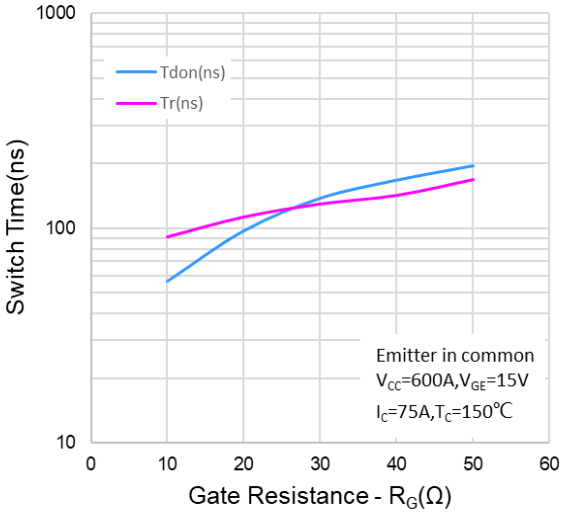


Figure 13.Turn-off Characteristics vs.Gate Resistance

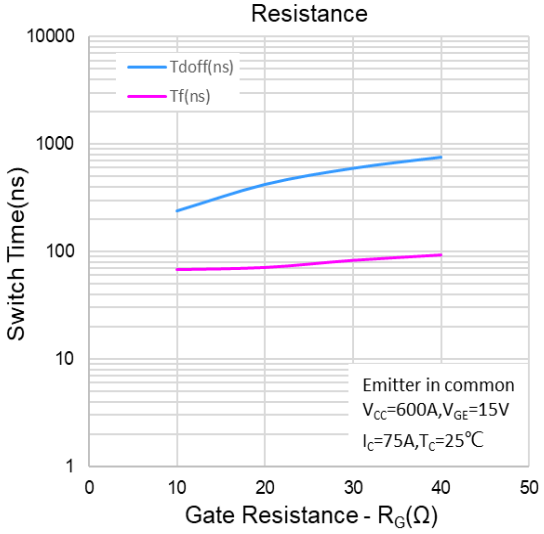


Figure 14.Turn-off Characteristics vs.Gate Resistance

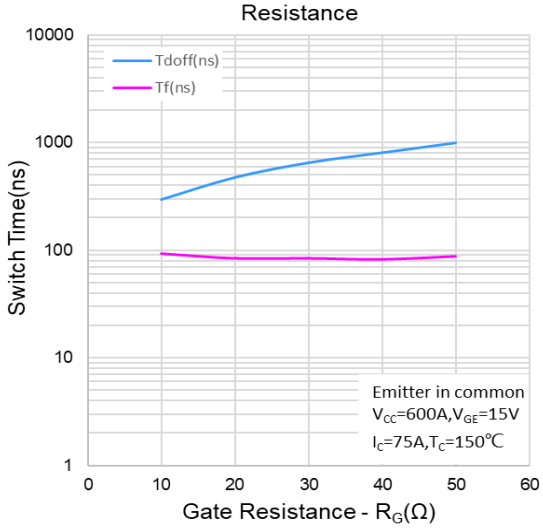


Figure 15.Switching Loss vs.Gate Resistance

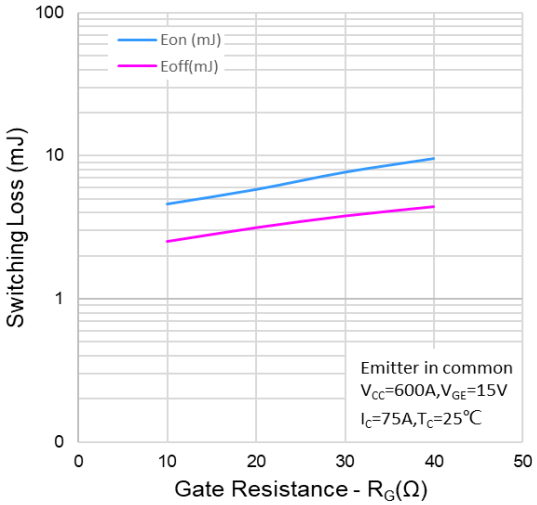


Figure 16.Switching Loss vs.Gate Resistance

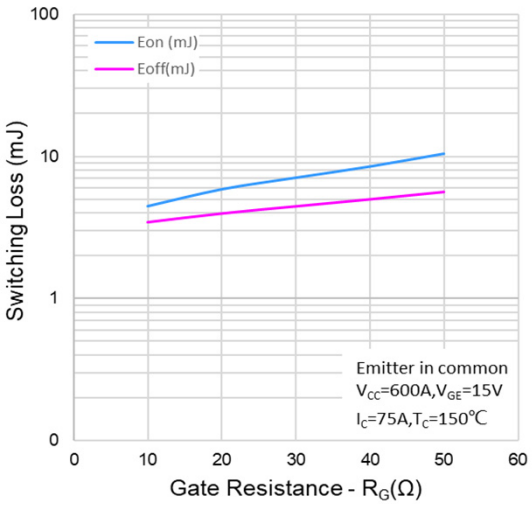


Figure 17.Turn-on Characteristics vs.Collector Current

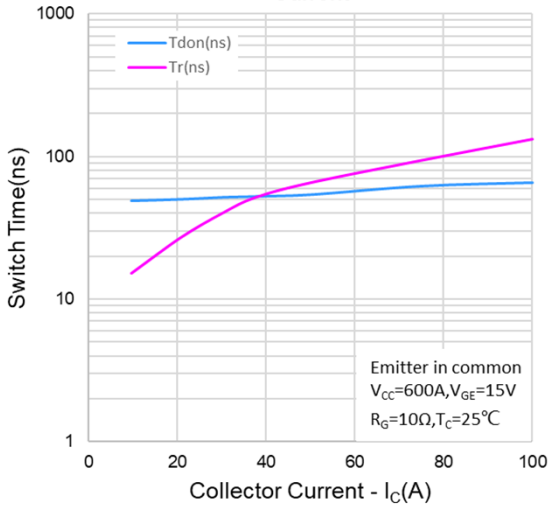


Figure 18.Turn-on Characteristics vs.Collector Current

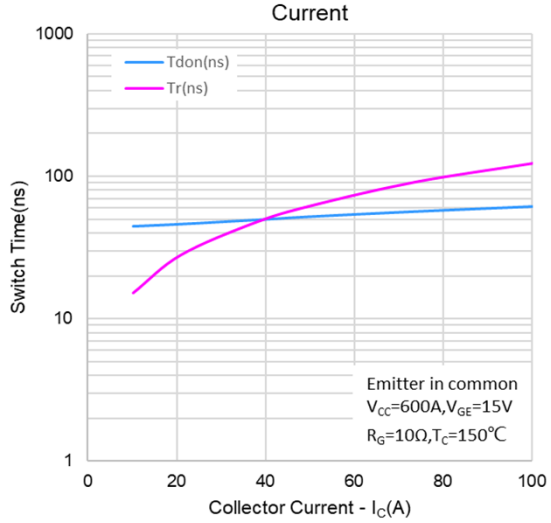


Figure 19.Turn-off Characteristics vs.Collector Current

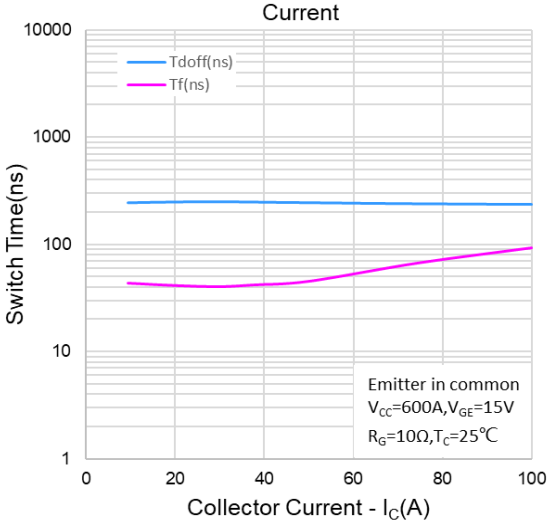


Figure 20.Turn-off Characteristics vs.Collector Current

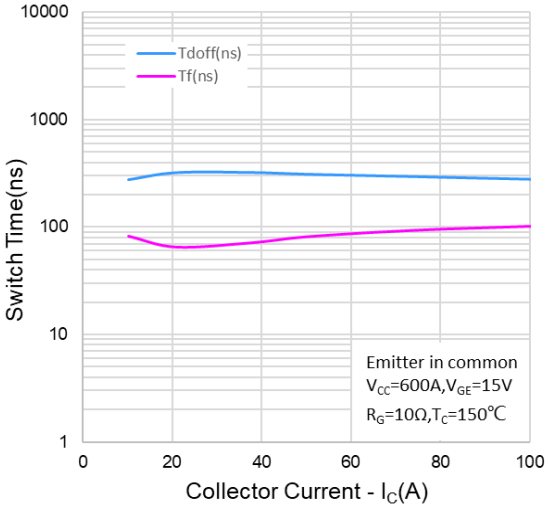


Figure 21.Switching Loss vs.Collector Current

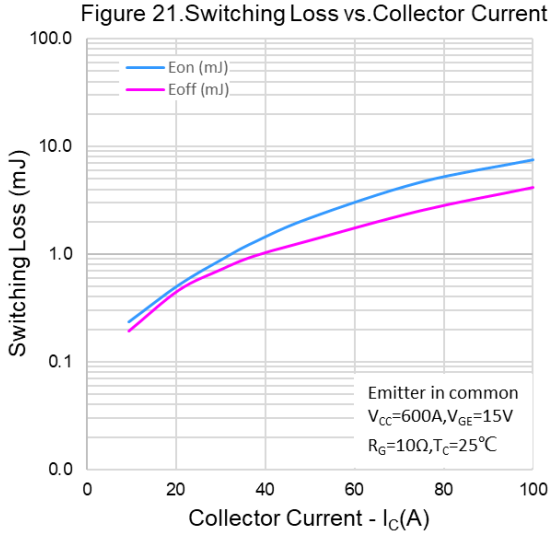


Figure 22.Switching Loss vs.Collector Current

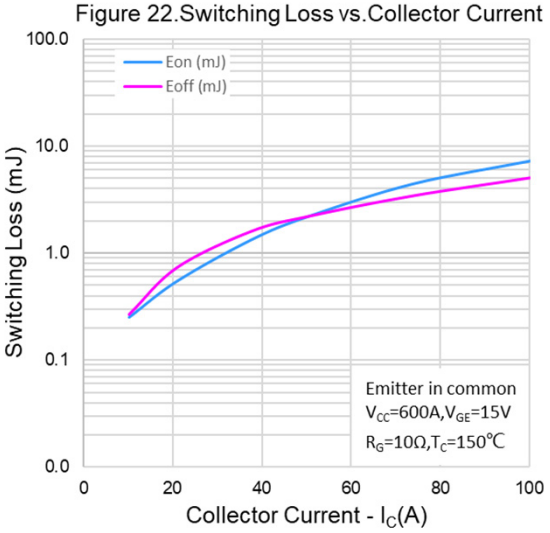


Figure 23.Maximum Collector current vs.Case Temperature

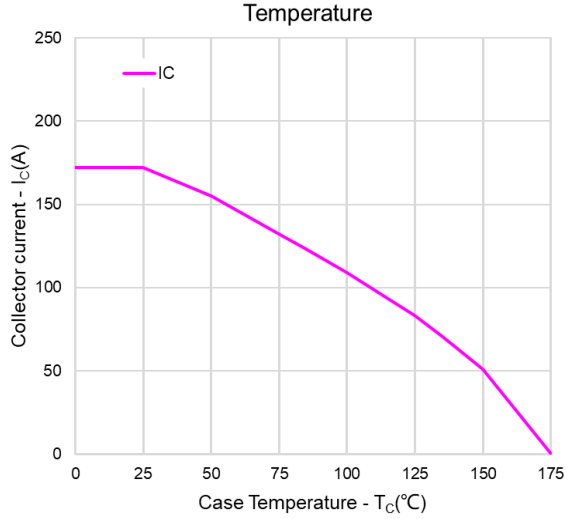


Figure 24.Power Dissipation as a Funcation of T_C

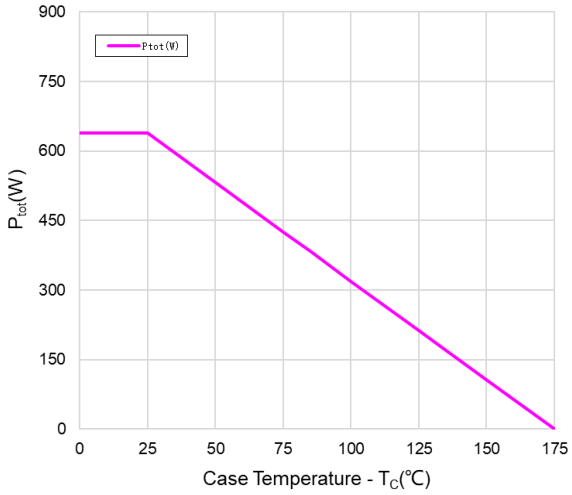


Figure 25 . Transient Thermal Impedance VS. On-pulse Duration(IGBT)

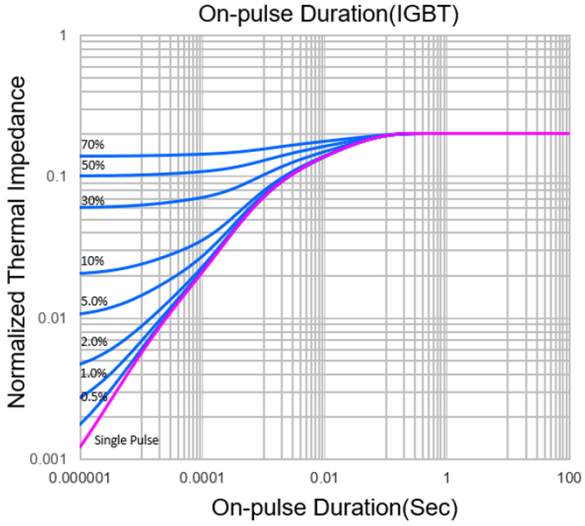


Figure 26.Transient Thermal Impedance VS.On-pulse Duration(SBD)

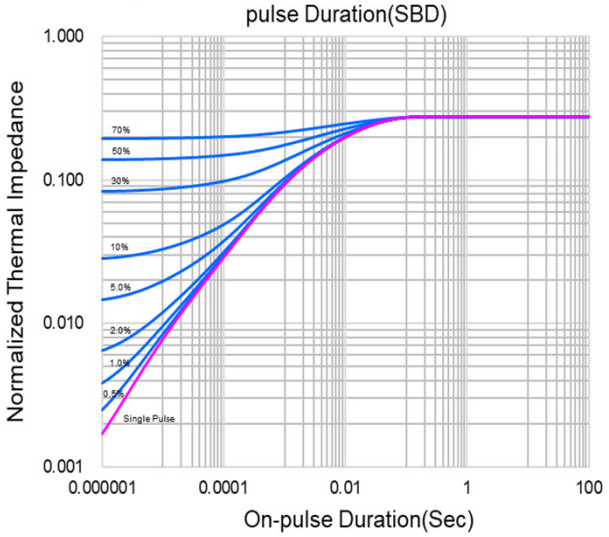


Figure 27. Max. Safe Operating Area

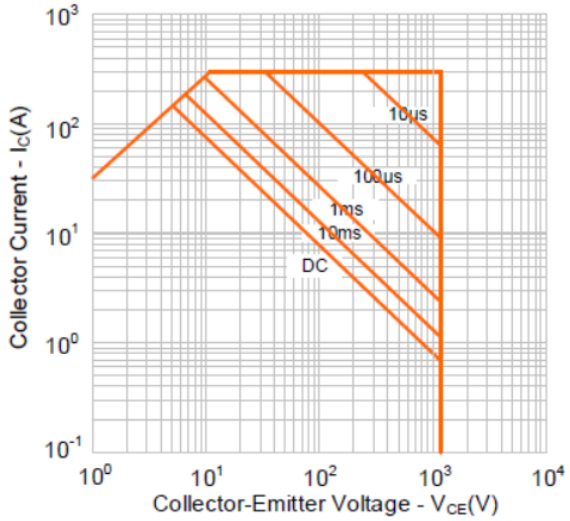
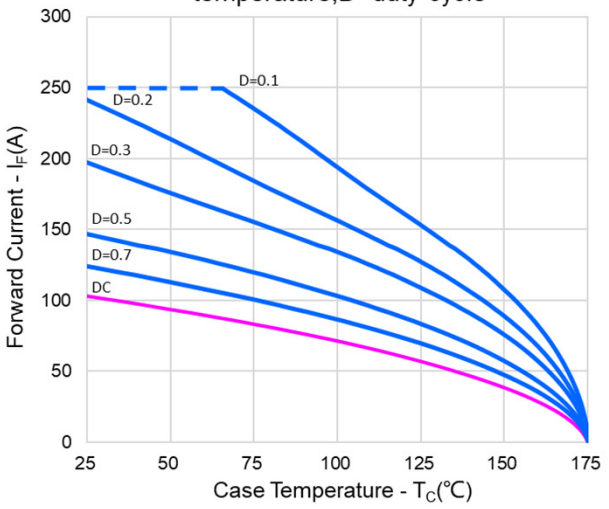
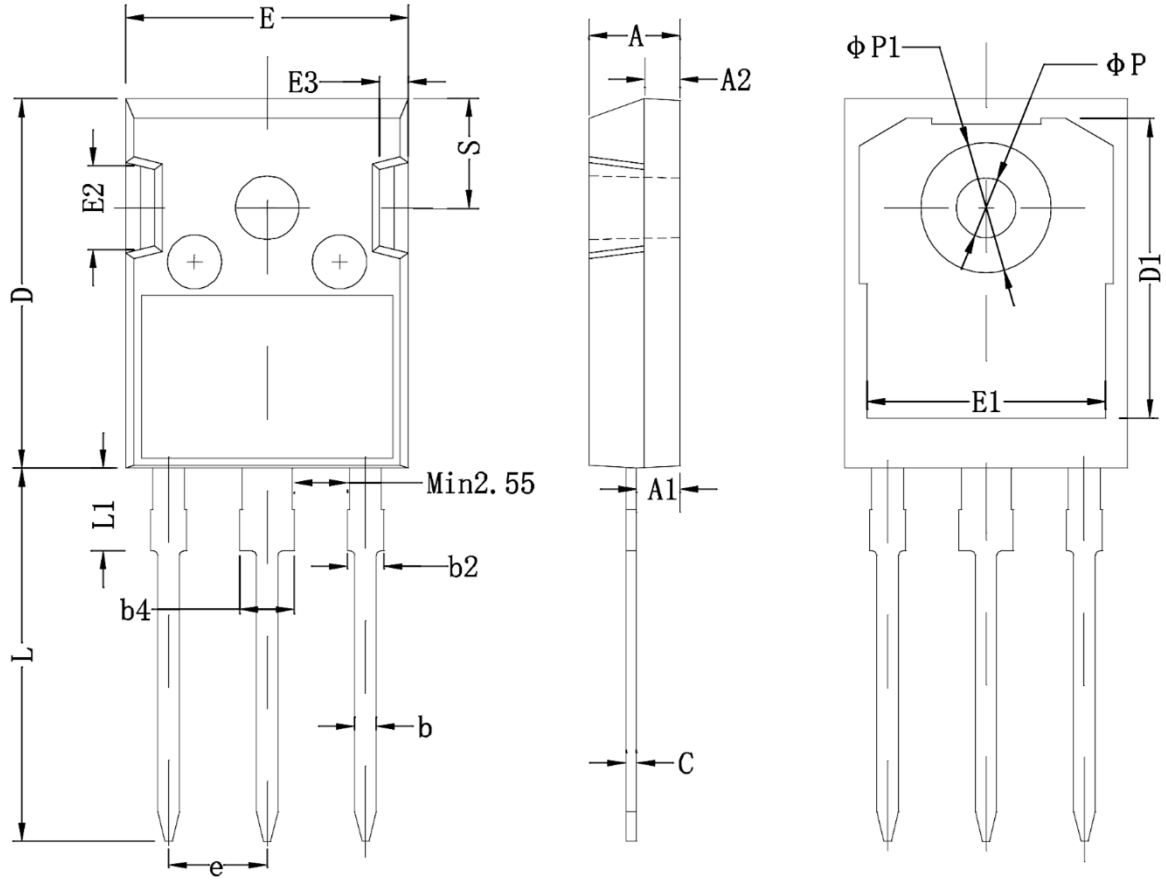


Figure 28.Diode forward current as function of temperature,D=duty cycle



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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