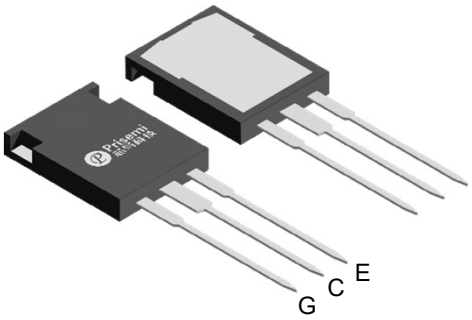
Prisemi®

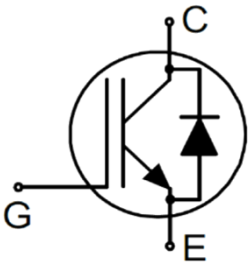
PI75S120TCHA7

Insulate-Gate Bipolar Transistor

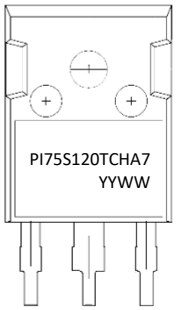
Description



TO-247PLUS-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 insulation

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= 25℃	I_F	150	A
	T_c= 100℃		75	
Diode Pulsed Current		I_{FM}	300	A
Power Dissipation		P_D	833	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=150℃	-	2.5	-	
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=75A	T_C=25℃	-	3.0	3.8	V
			T_C=150℃	-	2.6	-	
Turn-on Delay Time	$t_{d(on)}$	V_{CE}=600V, V_{GE}=15V, R_G=10Ω	I_C=75A	-	68	-	ns
			I_C=37.5A	-	66	-	
Rise Time	t_r		I_C=75A	-	38	-	
			I_C=37.5A	-	22	-	
Turn-off Delay Time	$t_{d(off)}$		I_C=75A	-	209	-	
			I_C=37.5A	-	220	-	
Fall Time	t_f		I_C=75A	-	37	-	
			I_C=37.5A	-	29	-	
Turn-on Energy Loss	E_{on}	V_{CE}=600V, V_{GE}=15V, R_G=10Ω	I_C=75A	-	5.8	-	mJ
			I_C=37.5A	-	1.88	-	
Turn-off Energy Loss	E_{off}		I_C=75A	-	2.4	-	
			I_C=37.5A	-	1.15	-	
Total Switching Loss	E_{st}		I_C=75A	-	8.2	-	
			I_C=37.5A	-	3.03	-	
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	-	
Diode Reverse Recovery Time	t_{rr}	I_{ES}=75A, dI_{ES}/dt=200A/μs		-	63	-	ns
Diode Reverse Recovery Charge	Q_{rr}			-	260	-	nC
Diode Reverse Recovery Current	I_{rm}			-	7.6	-	A

Electrical characteristics per line@150℃ (unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Turn-on Delay Time	$t_{d(on)}$	V_{CE}=600V, V_{GE}=15V, R_G=10Ω	I_C=75A	-	64	-	ns
			I_C=37.5A	-	60	-	
Rise Time	t_r		I_C=75A	-	42	-	
			I_C=37.5A	-	25	-	
Turn-off Delay Time	$t_{d(off)}$		I_C=75A	-	260	-	
			I_C=37.5A	-	294	-	
Fall Time	t_f		I_C=75A	-	89	-	
			I_C=37.5A	-	69	-	
Turn-on Energy Loss	E_{on}	V_{CE}=600V, V_{GE}=15V, R_G=10Ω	I_C=75A	-	5.98	-	mJ
			I_C=37.5A	-	2.04	-	
Turn-off Energy Loss	E_{off}		I_C=75A	-	3.84	-	
			I_C=37.5A	-	1.84	-	
Total Switching Loss	E_{st}		I_C=75A	-	9.82	-	
			I_C=37.5A	-	3.88	-	

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	$R_{th(J-C)}$	-	-	0.4	℃/W
Soldering Temperature@15 sec, 1 time (in Line)	T_{sold}	-	-	260	℃

Typical Characteristics

Figure 1. Typical Output Characteristics

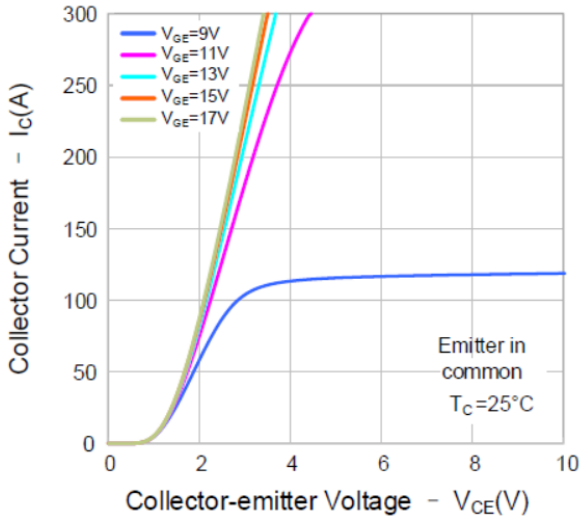


Figure 2. Typical Output Characteristics

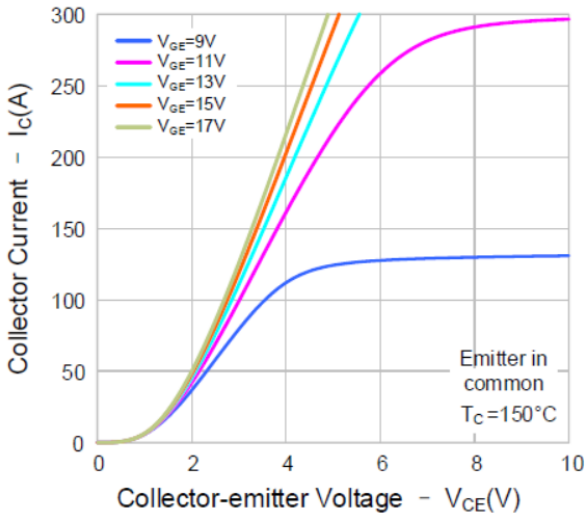


Figure 3. Typical Saturation Voltage Characteristics

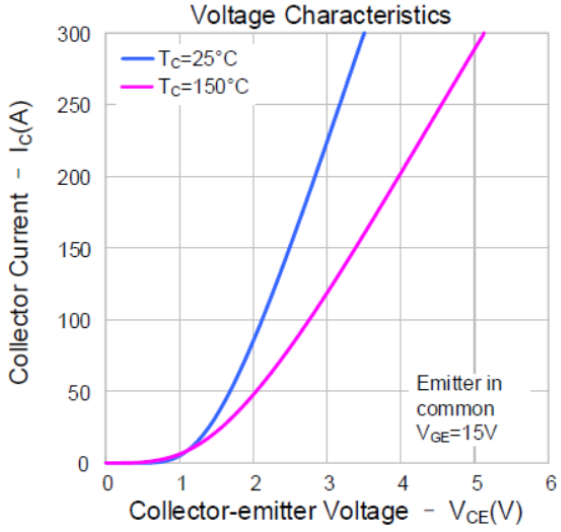


Figure 4. Transmission Characteristics

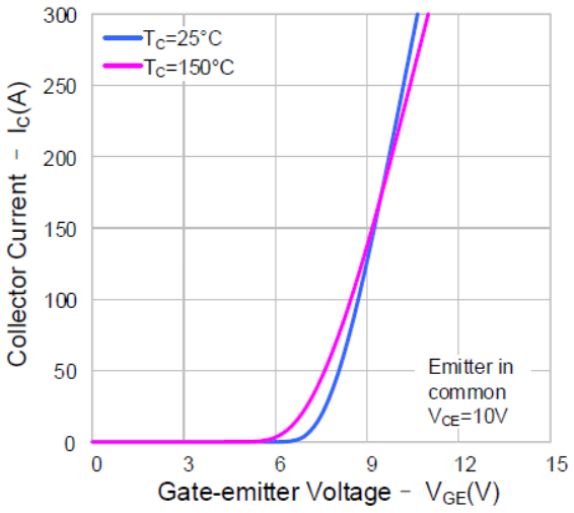


Figure 5. Saturation Voltage Drop vs. V_{GE}

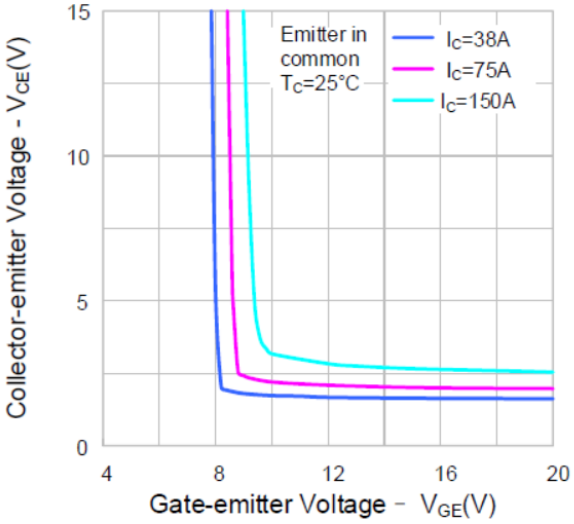


Figure 6. Saturation Voltage Drop vs. V_{GE}

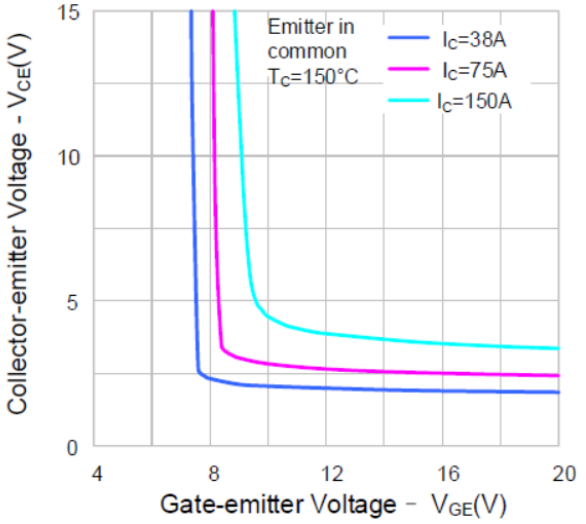


Figure 7. Saturation Voltage Drop vs. Temperature

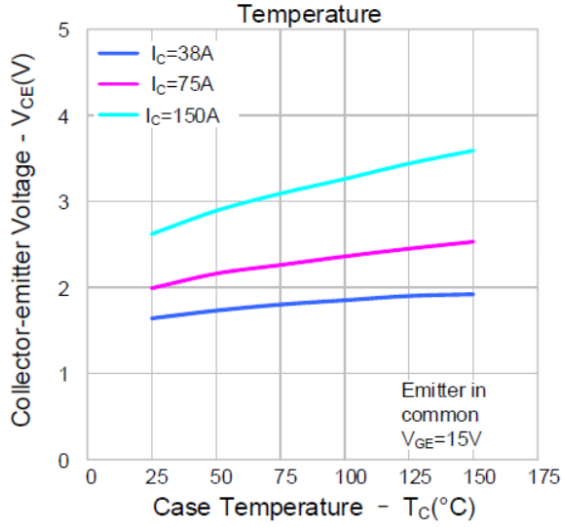


Figure 8. Capacitance Characteristics

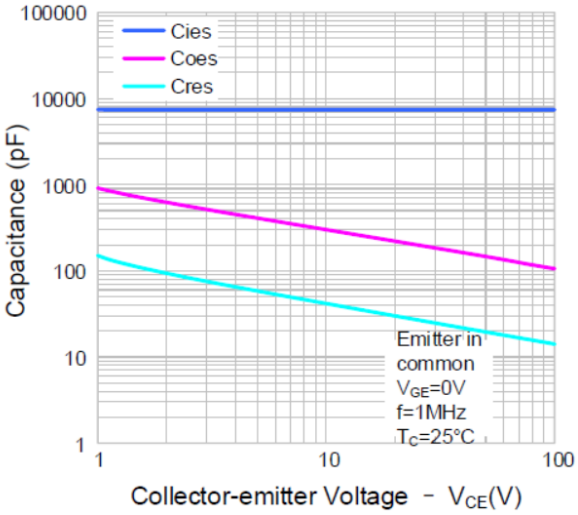


Figure 9. Gate Charge Characteristics

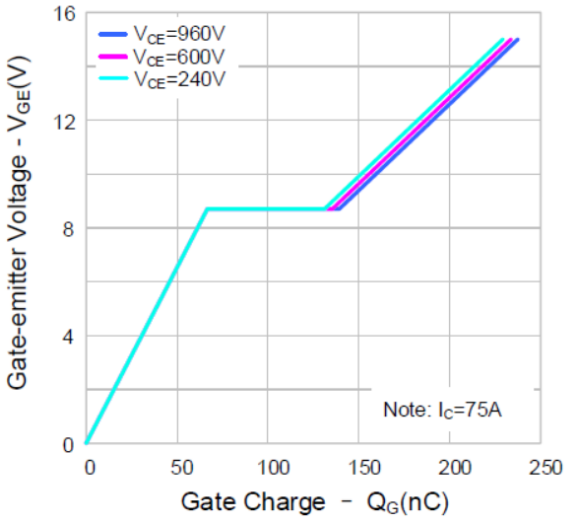


Figure 10. Forward Characteristics

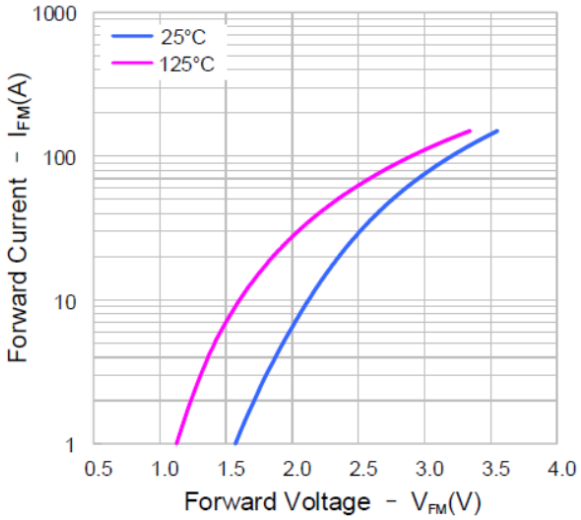


Figure 11. Turn-on Characteristics vs. Gate Resistance

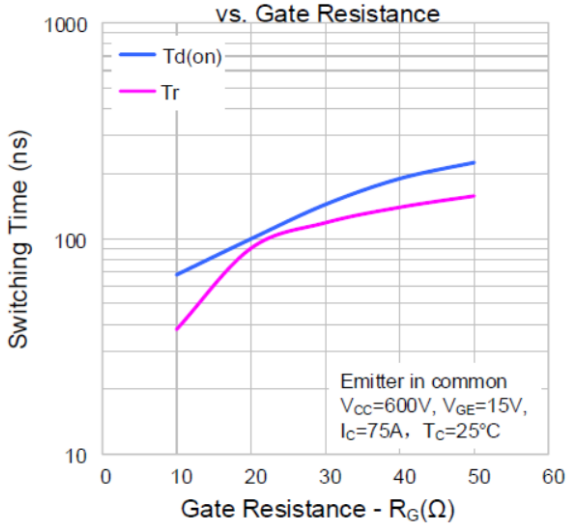


Figure 12. Turn-on Characteristics vs. Gate Resistance

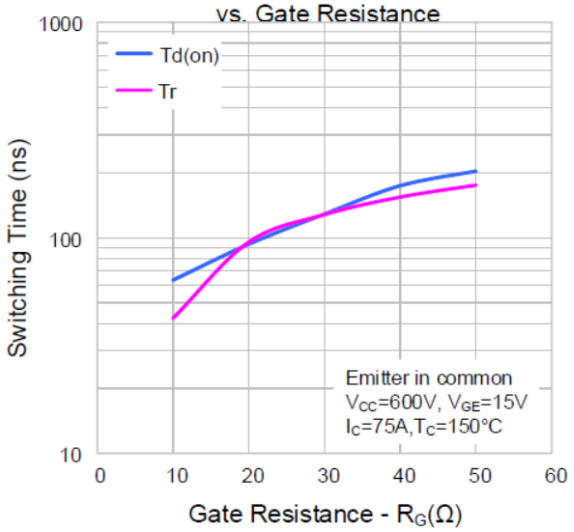


Figure 13. Turn-off Characteristics vs. Gate Resistance

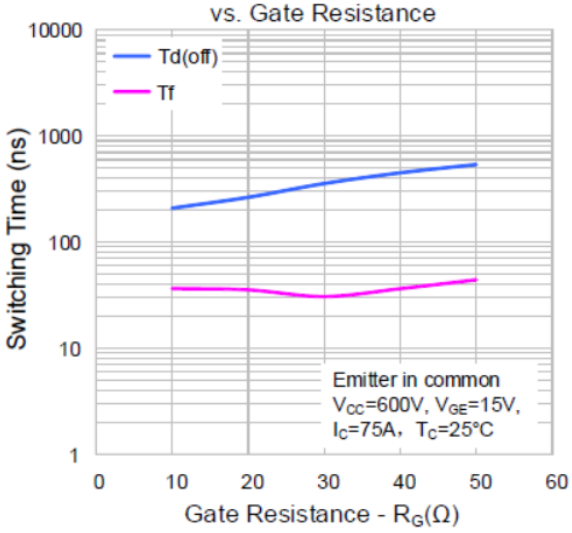


Figure 14. Turn-off Characteristics vs. Gate Resistance

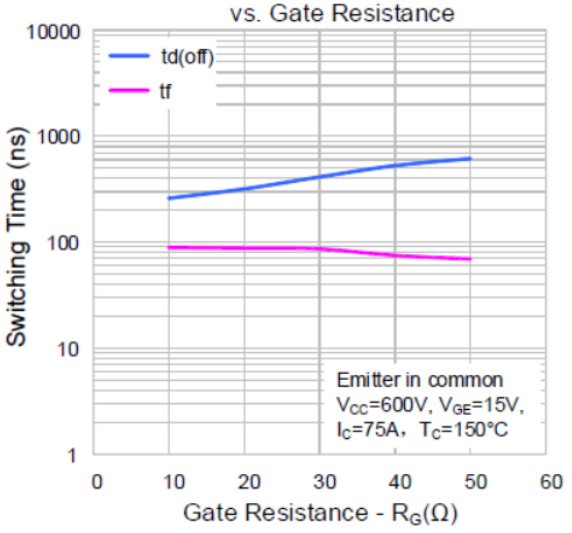


Figure 15. Switching Loss vs. Gate Resistance

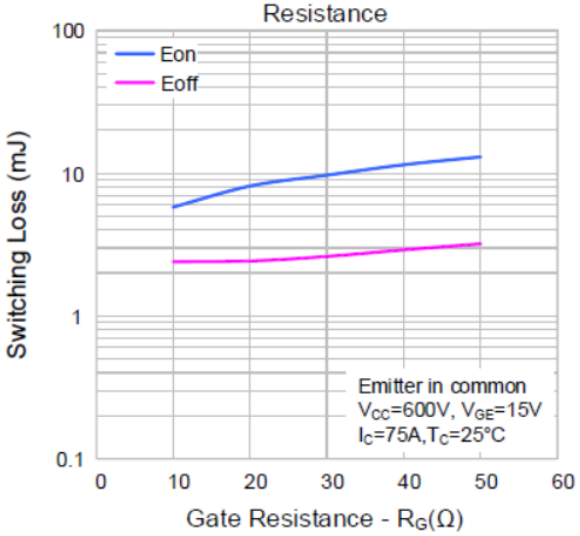


Figure 16. Switching Loss vs. Gate Resistance

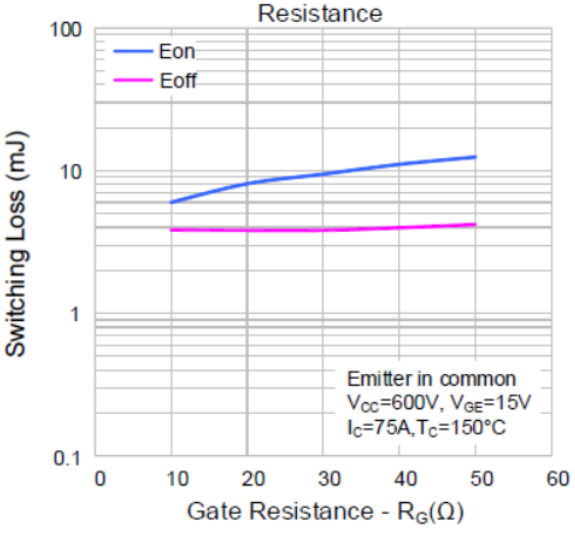


Figure 17. Turn-on Characteristics vs. Collector Current

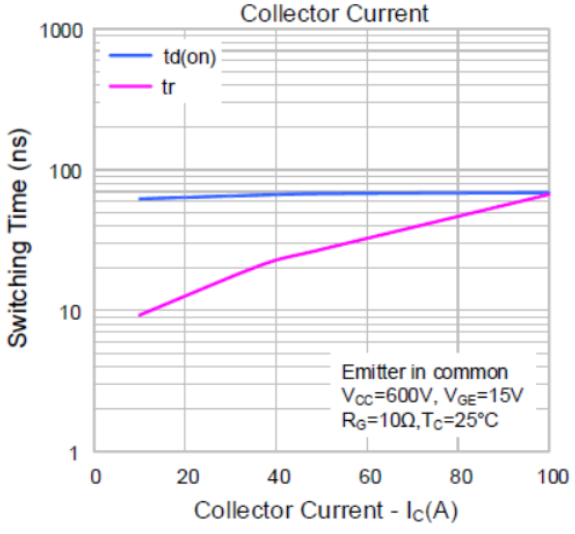


Figure 18. Turn-on Characteristics vs. Collector Current

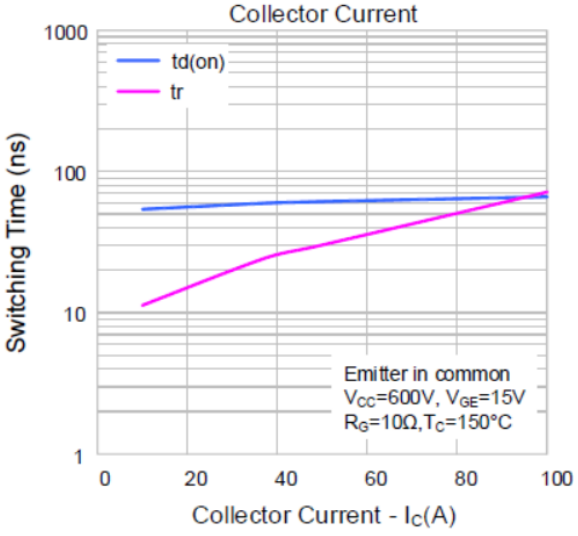


Figure 19. Turn-off Characteristics vs. Collector Current

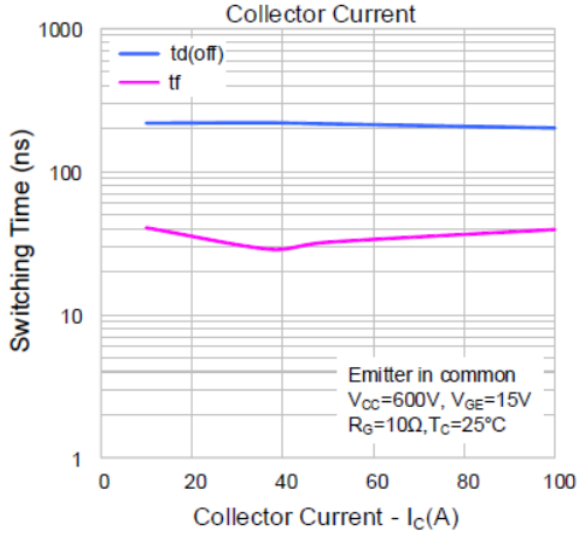


Figure 20. Turn-off Characteristics vs. Collector Current

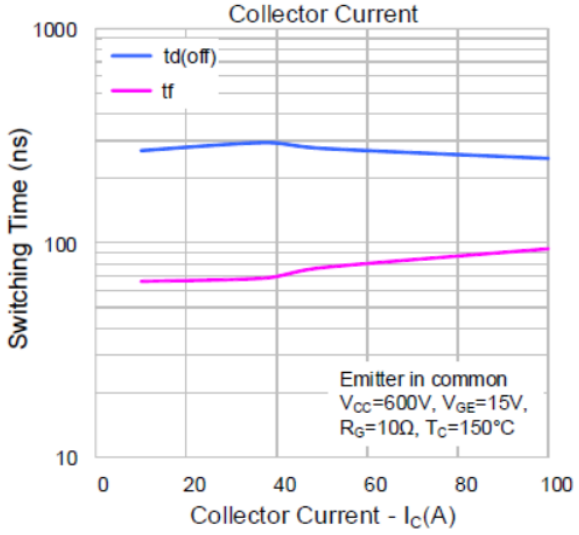


Figure 21. Switching Loss vs. Collector Current

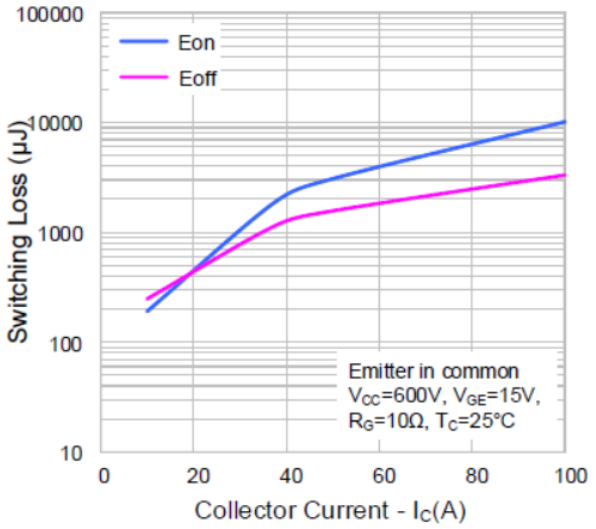


Figure 22. Switching Loss vs. Collector Current

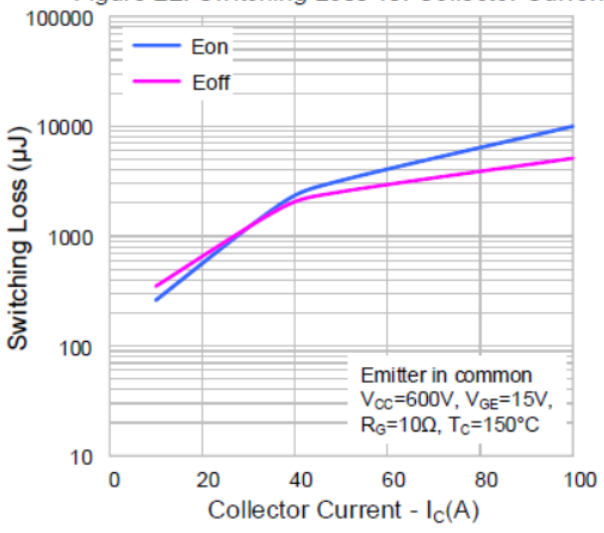


Figure 23. Reverse Recovery Time vs. Forward Current

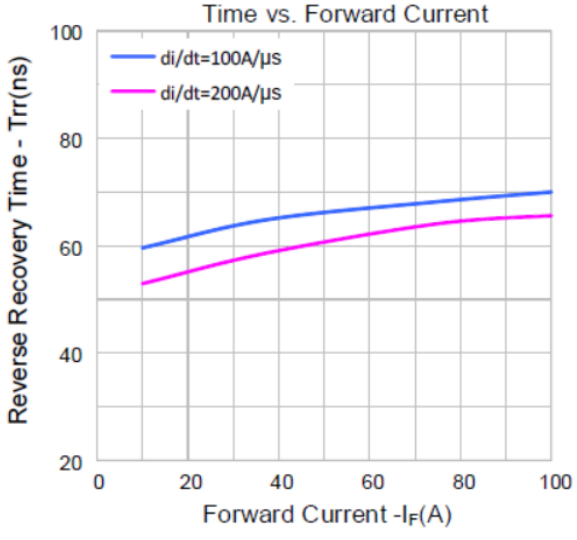


Figure 24. Reverse Recovery Charge vs. Forward Current

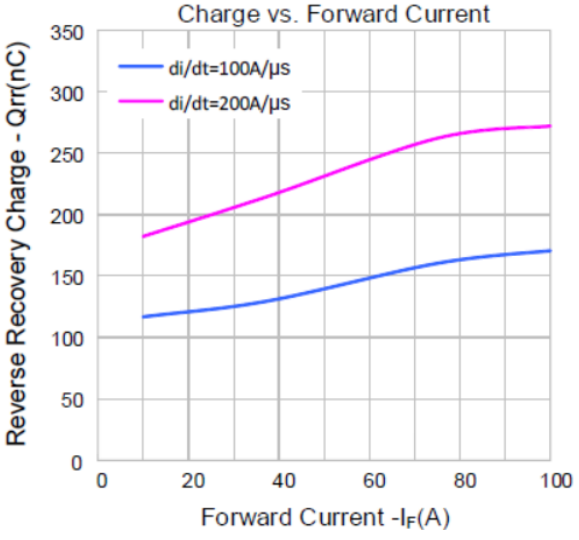


Figure 25. Peak Reverse Recovery Current vs. Forward Current

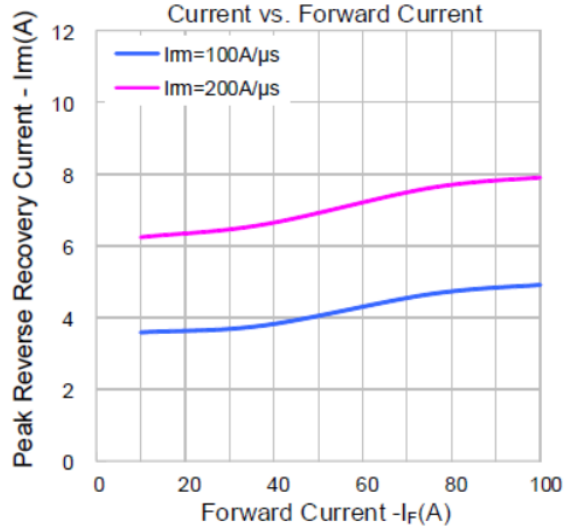


Figure 26. Tb Slope vs. Forward Current

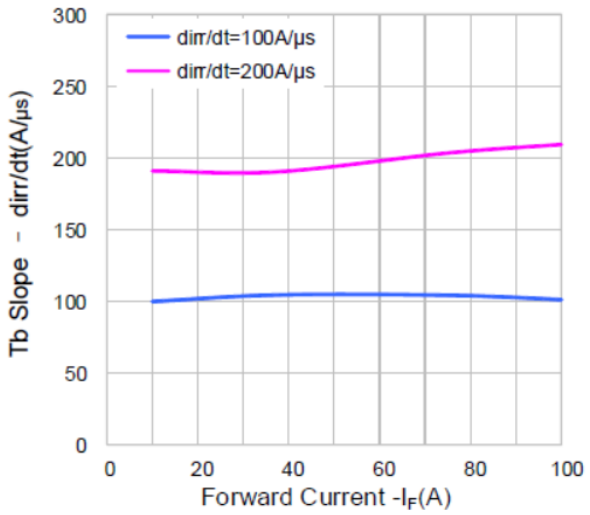


Figure 27. Max. Safe Operating Area

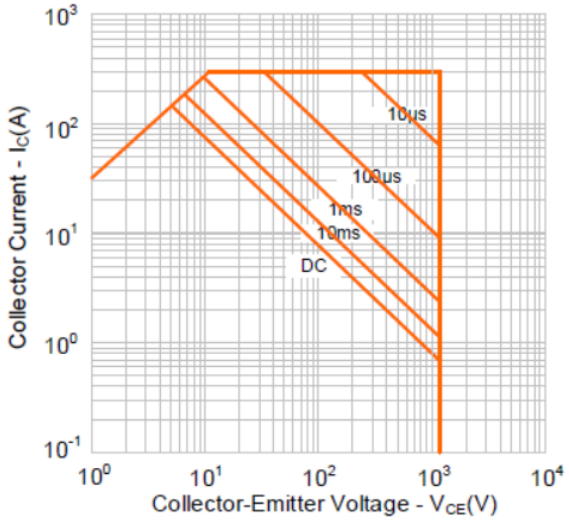


Figure 28. Transient Thermal Impedance vs. On-pulse Duration (IGBT)

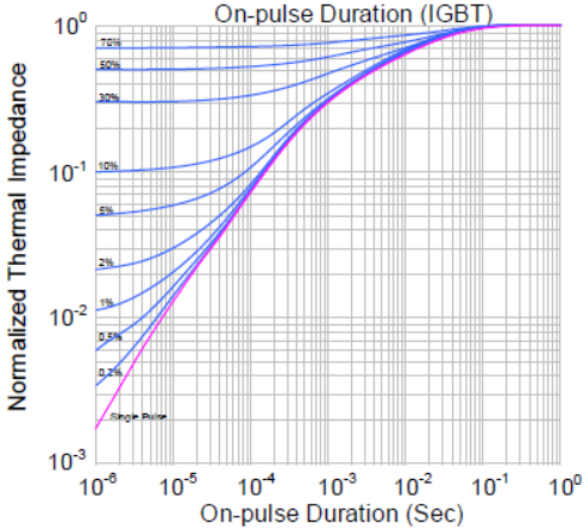
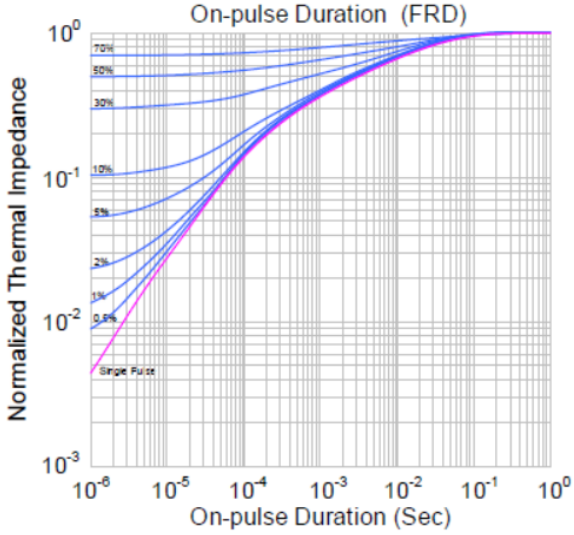
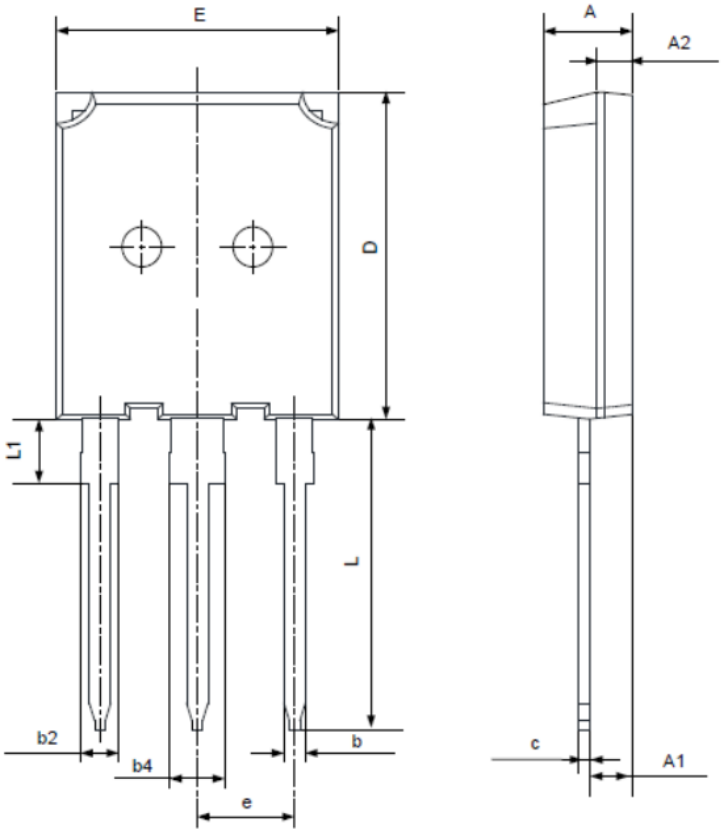


Figure 29. Transient Thermal Impedance vs. On-pulse Duration (FRD)



Product Dimension (TO-247PLUS-3L)



Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	4.90	5.00	0.193	0.197
A1	2.31	2.51	0.091	0.099
A2	1.90	2.10	0.075	0.083
b	1.16	1.26	0.046	0.050
b2	-	2.25	-	0.089
b4	-	3.25	-	0.128
c	0.59	0.66	0.023	0.026
D	20.90	21.10	0.823	0.831
E	15.70	15.90	0.618	0.626
e	5.436 BSC		0.214 BSC	
L	19.80	20.10	0.780	0.791
L1	-	4.30	-	0.169

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