



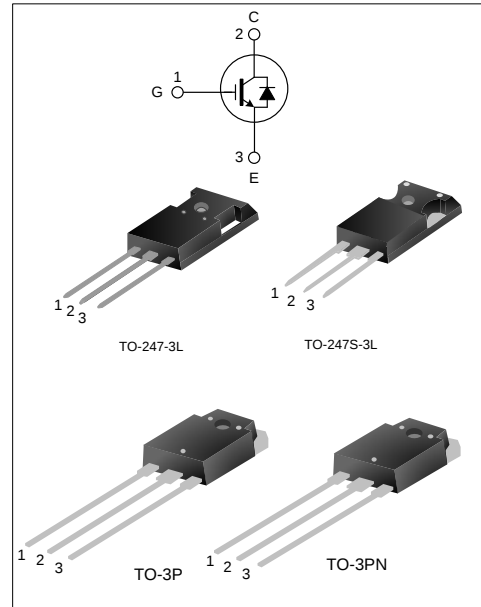
60A, 600V FIELD STOP IGBT

DESCRIPTION

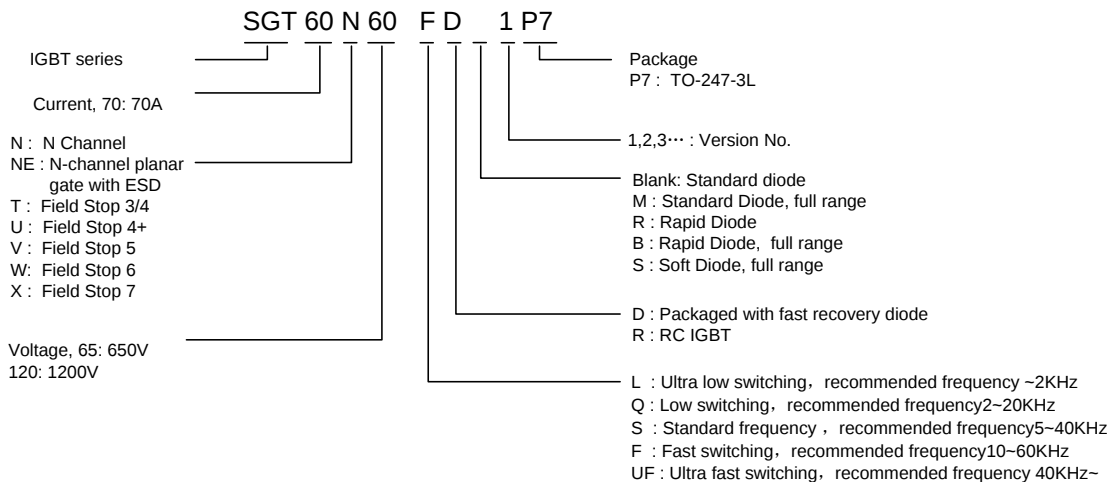
SGT60N60FD1PN/P7/PS/PT adopts Field Stop IGBT technology, offer the optimum performance for induction Heating, UPS, SMPS and PFC application.

FEATURES

- 60A, 600V, $V_{CE(sat)}(typ.)=2.2V@I_C=60A$
- Low conduction loss
- Fast switching
- High input impedance



NOMENCLATURE



ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SGT60N60FD1PN	TO-3P	60N60FD1	Pb free	Tube
SGT60N60FD1P7	TO-247-3L	60N60FD1	Pb free	Tube
SGT60N60FD1PS	TO-247S-3L	60N60D1	Pb free	Tube
SGT60N60FD1PT	TO-3PN	60N60FD1	Pb free	Tube



ABSOLUTE MAXIMUM RATINGS (T_C = 25°C UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Ratings	Units
Collector to Emitter Voltage	V _{CE}	600	V
Gate to Emitter Voltage	V _{GE}	±20	V
Collector Current	I _C	T _C =25°C	A
		T _C =100°C	
Pulsed Collector Current	I _{CM}	180	A
Maximum Power Dissipation (T _C =25°C)	P _D	321	W
Operating Junction Temperature	T _J	-55~+175	°C
Storage Temperature Range	T _{stg}	-55~+175	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings	Units
Thermal Resistance, Junction to Case(IGBT)(TO-3P)	R _{θJC}	0.39	°C/W
Thermal Resistance, Junction to Case(FRD)(TO-3P)	R _{θJC}	1.10	°C/W
Thermal Resistance, Junction to Ambient(TO-3P)	R _{θJA}	40	°C/W

ELECTRICAL CHARACTERISTICS OF IGBT(T_C=25°C, UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units
Collector to Emitter Breakdown Voltage	BV _{CE}	V _{GE} =0V, I _C =250μA	600	--	--	V
C-E Leakage Current	I _{CES}	V _{CE} =600V, V _{GE} =0V	--	--	200	μA
G-E Leakage Current	I _{GES}	V _{GE} =20V, V _{CE} =0V	--	--	±400	nA
G-E Threshold Voltage	V _{GE(th)}	I _C =250μA, V _{CE} =V _{GE}	4.0	5.0	6.5	V
Collector to Emitter Saturation Voltage	V _{CE(sat)}	I _C =60A, V _{GE} =15V	--	2.2	2.7	V
		I _C =60A, V _{GE} =15V, T _C =125°C	--	2.6	--	V
Input Capacitance	C _{ies}	V _{CE} =30V	--	2850	--	pF
Output Capacitance	C _{oes}	V _{GE} =0V	--	294	--	
Reverse Transfer Capacitance	C _{res}	f=1MHz	--	85	--	
Turn-On Delay Time	T _{d(on)}	V _{CE} =400V I _C =60A R _g =10Ω	--	36	--	ns
Rise Time	T _r		--	142	--	
Turn-Off Delay Time	T _{d(off)}		--	193	--	
Fall Time	T _f		--	136	--	
Turn-On Switching Loss	E _{on}	V _{GE} =15V Inductive Load,	--	3.72	--	mJ
Turn-Off Switching Loss	E _{off}		--	1.77	--	
Total Switching Loss	E _{st}		--	5.49	--	
Total Gate Charge	Q _g	V _{CE} =400V, I _C =60A, V _{GE} =15V	--	179	--	nC
Gate to Emitter Charge	Q _{ge}		--	23	--	
Gate to Collector Charge	Q _{gc}		--	100	--	

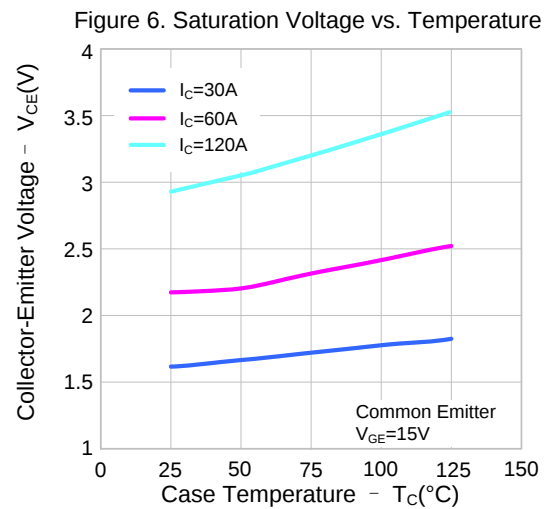
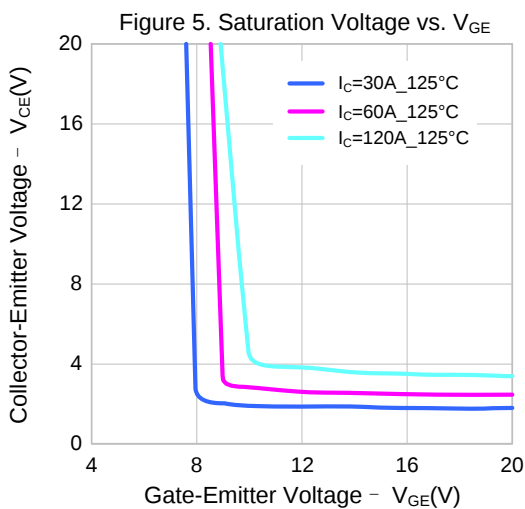
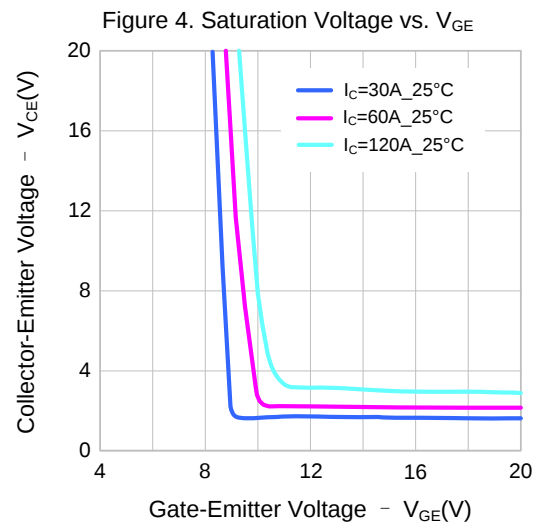
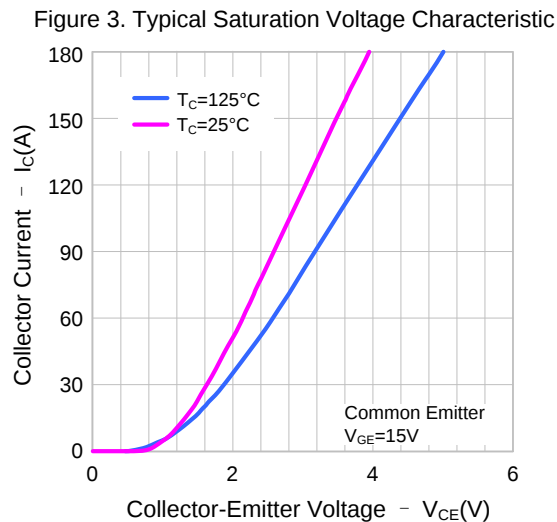
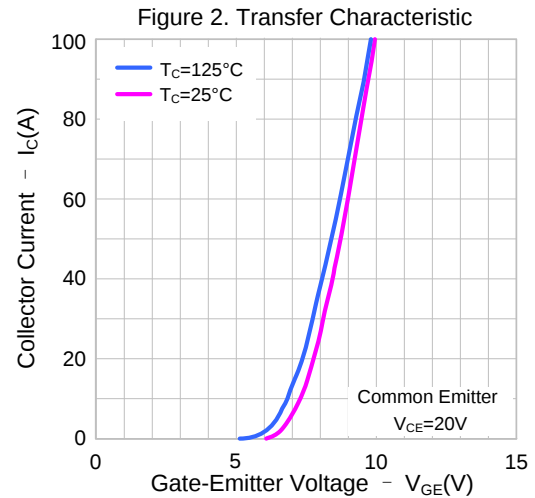
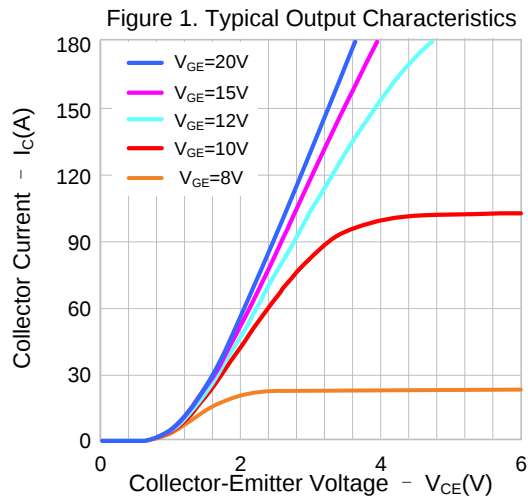


ELECTRICAL CHARACTERISTICS OF FRD(T_C=25°C UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	V _{FM}	I _F =30A, T _C =25°C	--	1.9	2.6	V
		I _F =30A, T _C =125°C	--	1.5	--	
Diode Reverse Recovery Time	T _{rr}	I _{ES} =30A, dI _{ES} /dt=200A/μs	--	38	--	ns
Diode Reverse Recovery Charge	Q _{rr}	I _{ES} =30A, dI _{ES} /dt=200A/μs	--	85	--	nC



TYPICAL CHARACTERISTICS CURVE





TYPICAL CHARACTERISTICS CURVE (CONTINUED)

Figure 7. Capacitance Characteristic

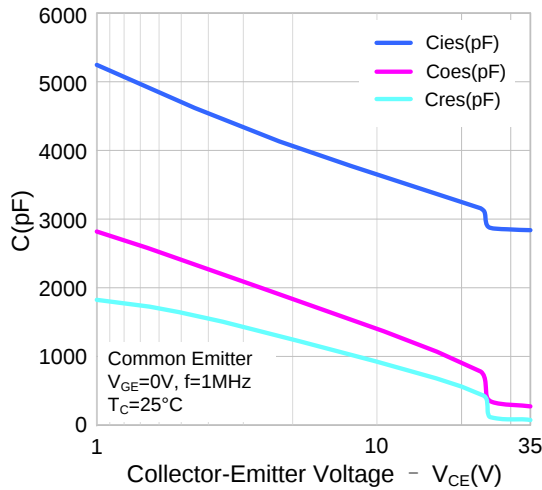


Figure 8. Gate Charge Characteristic

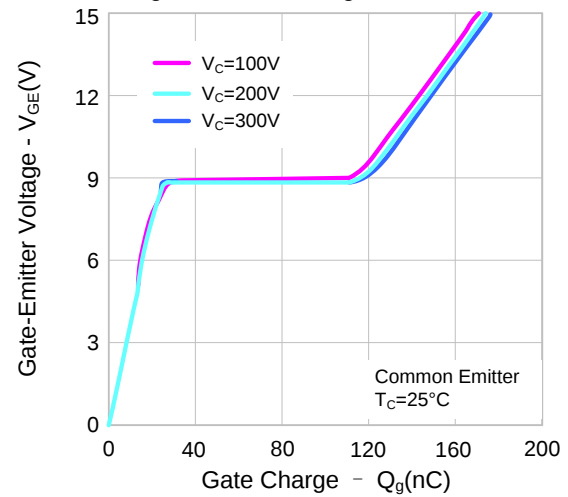


Figure 9. Turn-on Characteristic vs. Gate Resistance

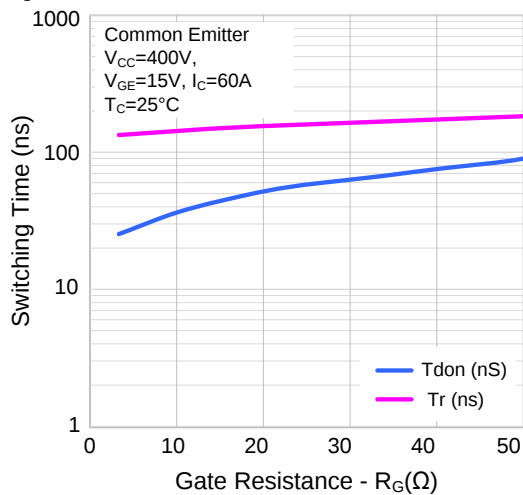


Figure 10. Turn-off Characteristic vs. Gate Resistance

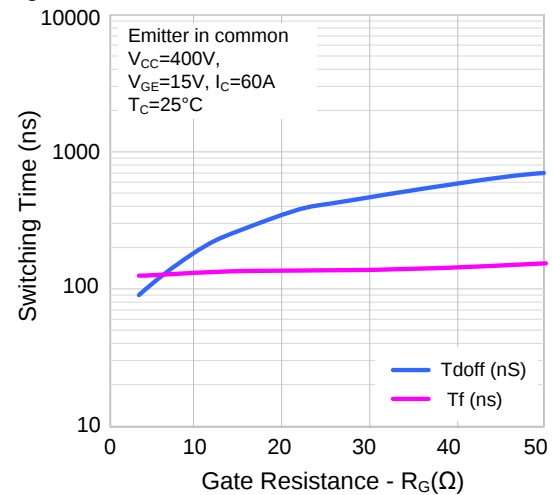


Figure 11. Switching Loss vs. Gate Resistance

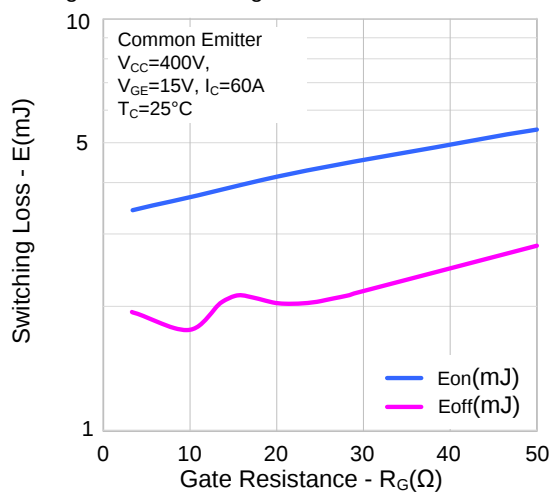
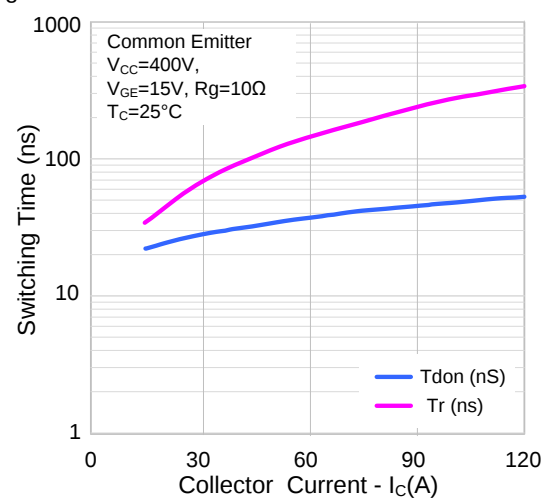


Figure 12. Turn-on Characteristic vs. Collector Current





TYPICAL CHARACTERISTICS CURVE (CONTINUED)

Figure 13. Turn-off Characteristic vs. Collector Current

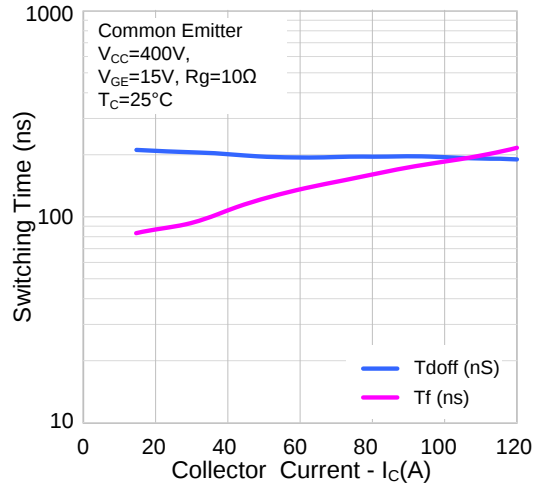


Figure 14. Switching Loss vs. Collector Current

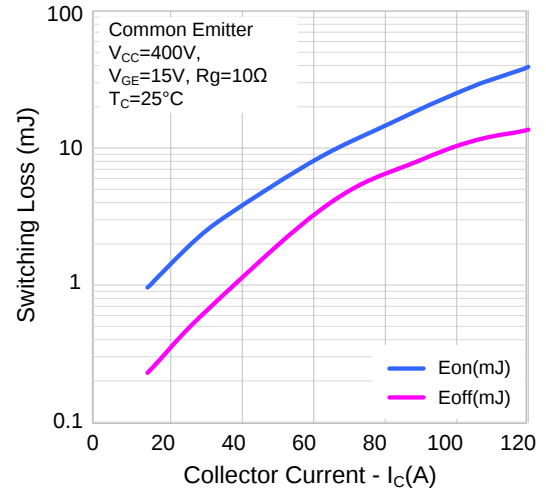


Figure 15. Forward Characteristic

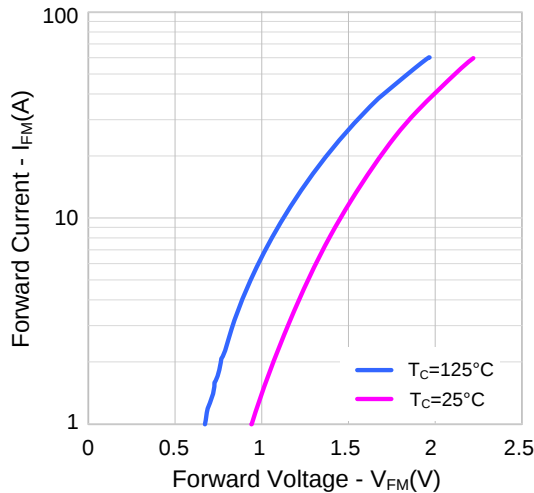


Figure 16. Reverse Recovery Time vs. Forward Current

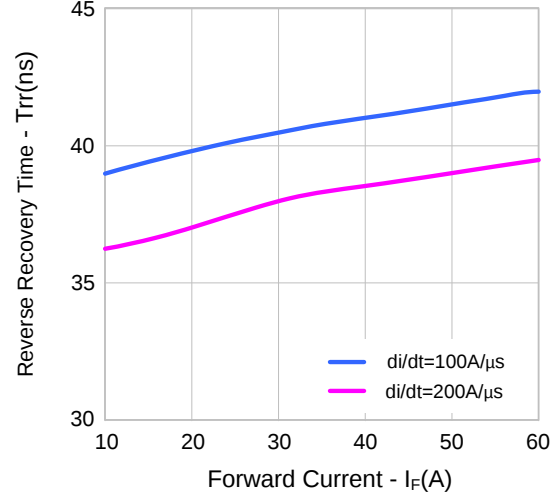


Figure 17. Reverse Recovery Charge vs. Forward Current

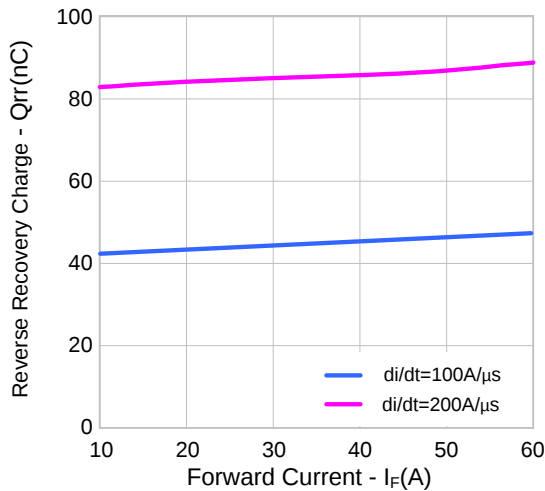
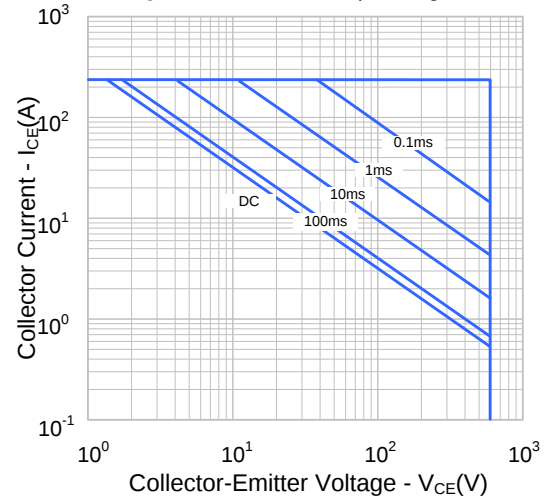


Figure 18. Max. Safe Operating Area





TYPICAL CHARACTERISTICS CURVE (CONTINUED)

Figure 19. Square Wave Impedance Simulation (IGBT)

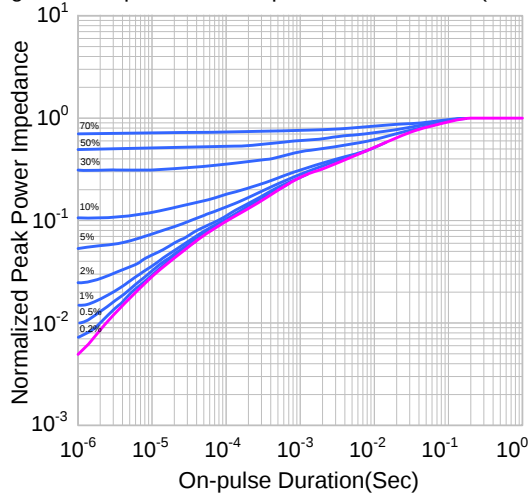
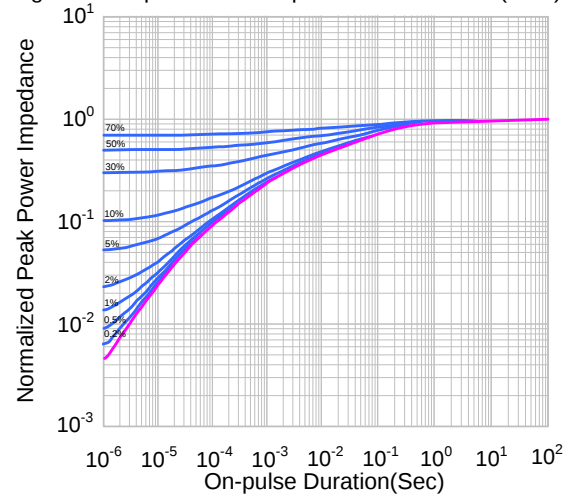


Figure 20. Square Wave Impedance Simulation (FRD)

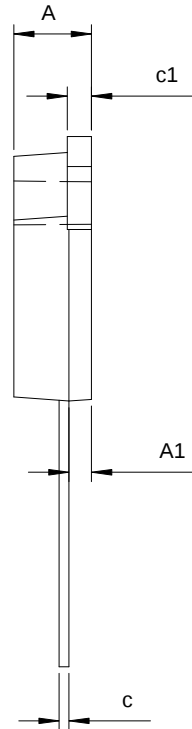
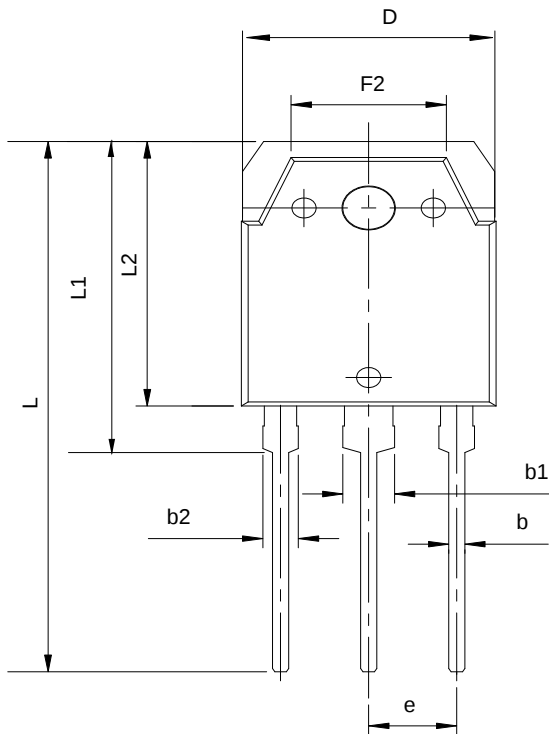




PACKAGE OUTLINE

TO-3P

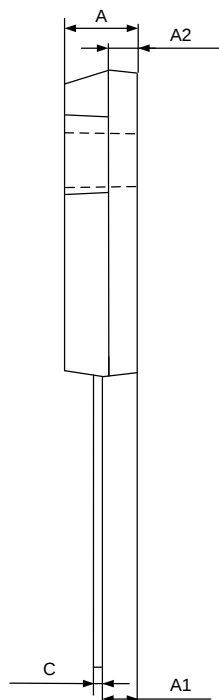
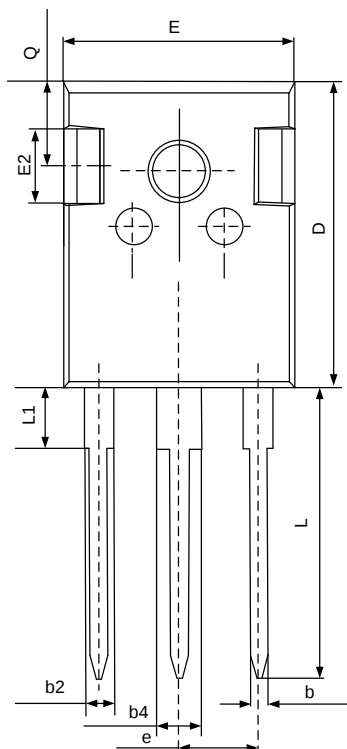
Unit: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.4	—	5.2
C1	1.2	—	1.8
A1	1.2	—	2.0
b	0.7	1.0	1.3
b1	2.7	3.0	3.3
b2	1.7	2.0	2.3
D	15.0	15.5	16.0
C	0.4	0.6	0.8
F2	8.5	—	10.0
e	5.45 TYP		
L1	22.6	—	23.6
L	39.0	—	41.5
L2	19.5	—	21.0

TO-247-3L

Unit: mm



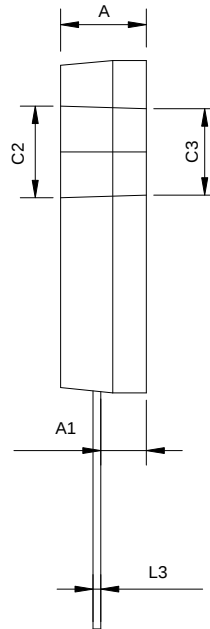
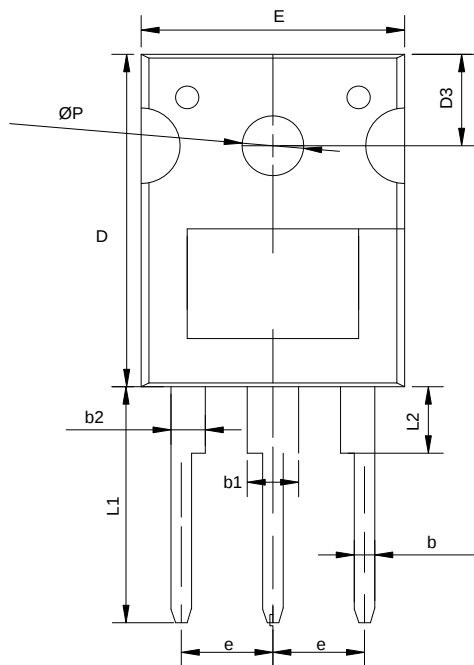
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	—	1.36
b2	1.91	—	2.25
b4	2.91	—	3.25
c	0.51	—	0.75
D	20.80	21.00	21.30
E	15.50	15.80	16.10
E2	4.40	5.00	5.20
e	5.44 BSC		
L	19.72	19.92	20.22
L1	—	—	4.30
Q	5.60	5.80	6.00



PACKAGE OUTLINE(CONTINUED)

TO-247S-3L

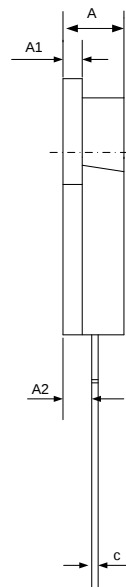
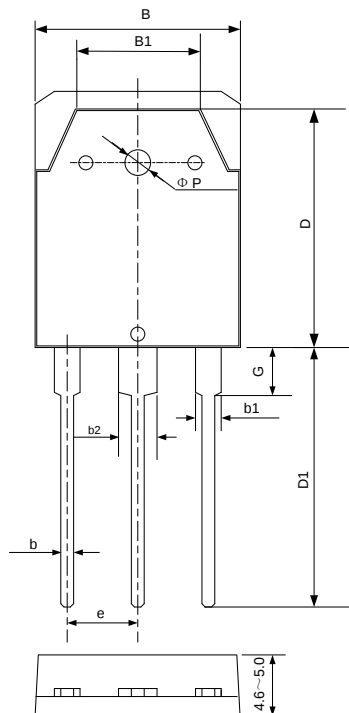
Unit: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.30	2.50	2.70
b	1.10	1.20	1.30
b1	2.90	3.10	3.30
b2	1.90	2.10	2.30
c2	5.50	6.00	6.50
c3	4.95	5.10	5.25
D	19.00	20.00	21.00
D3	5.30	5.50	5.70
e	5.34	5.44	5.54
E	15.40	15.60	15.80
L1	14.40	14.60	14.80
L2	3.85	4.00	4.15
L3	0.35	0.50	0.65
ØP	3.40	3.60	3.80

TO-3PN

Unit: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.60	4.80	5.00
A1	1.30	1.50	1.70
A2	2.20	2.40	2.60
b	0.80	1.00	1.20
b1	1.80	2.00	2.20
b2	2.90	3.10	3.30
B	15.20	15.60	16.00
B1	9.10	9.30	9.50
c	0.50	0.60	0.70
D	18.30	18.50	18.70
D1	19.00	19.50	20.00
e	5.25	5.45	5.65
G	2.80	3.00	3.20
ØP	3.00	3.20	3.40



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- The instructions are subject to change without notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
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Rev.: 1.7

Revision History:

1. Add package outline of TO-3PN

Rev.: 1.6

Revision History:

1. Add package outline of TO-247S-3L

Rev.: 1.5

Revision History:

1. Modify Package stereogram and Important notice

Rev.: 1.4

Revision History:

1. Update the package outline of TO-247-3L

Rev.: 1.3

Revision History:

1. Modify the Max Value of Junction Temperature

Rev.: 1.2

Revision History:

1. Modify annotation of Fig.13

Rev.: 1.1

Revision History:

1. Modify the characteristics

Rev.: 1.0

Revision History:

1. First release