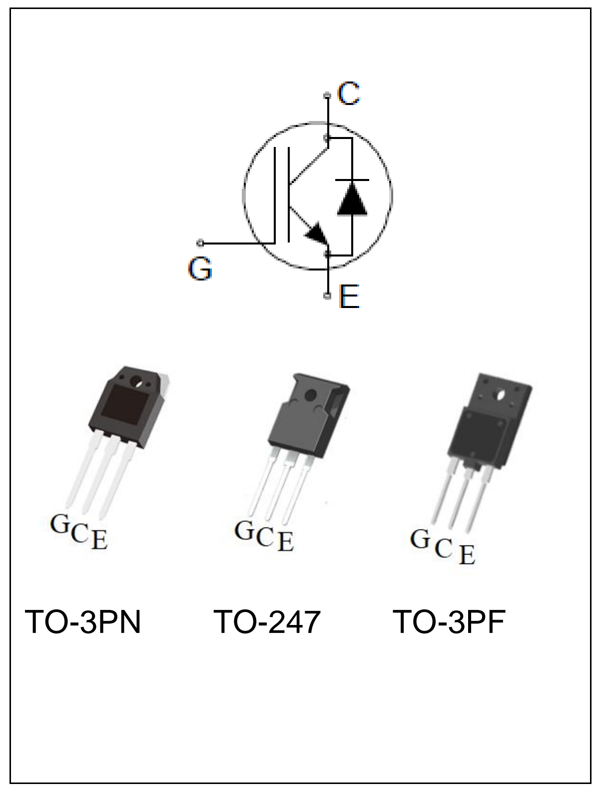
BLG50T65FDLA

IGBT

1. Description

BLG50T65FDLA is obtained by advanced Trench Field Stop (T-FS) technology which is characteristic with low V_{CE}(sat), optimized switching performance and low gate charge Qg. The IGBT is suitable device for Photovoltaic, UPS and high switching frequency applications.



KEY CHARACTERISTICS

Parameter	Value	Unit
V_{CES}	650	V
I_C	50	A
$V_{CE(sat).typ}$	1.6	V

FEATURES

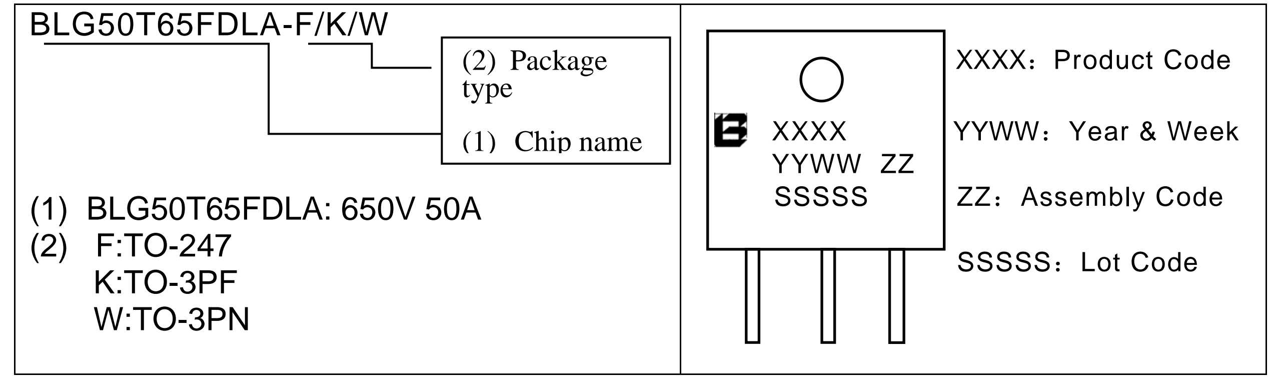
- Fast Switching
- Low $V_{CE(sat)}$
- Positive temperature coefficient
- Fast recovery anti-parallel diode
- RoHS product

APPLICATIONS

- Photovoltaic converters
- UPS

ORDERING INFORMATION

Device Marking	Ordering Codes	Package	Product Code	Packing
50T65FDLA	BLG50T65FDLA-F	TO-247	G50T65FDLA	Tube
	BLG50T65FDLA-K	TO-3PF	G50T65FDLA	Tube
	BLG50T65FDLA-W	TO-3PN	G50T65FDLA	Tube



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2. ABSOLUTE RATINGS

Symbol	Parameter	TO-3PN/TO-247	TO-3PF	Units
V_{CES}	Collector-Emitter Voltage	650	650	V
I_C	Collector Current @T_C=25°C	100	100	A
	Collector Current @T_C=100°C	50	50	A
I_{CM}	Pulsed Collector Current, tp limited by T_{Jmax}	200	200	A
I_F	Diode Continuous Forward Current @T_C=25°C	100	100	A
	Diode Continuous Forward Current @T_C=100°C	50	50	A
I_{FM}	Diode Maximum Forward Current, limited by T_{Jmax}	200	200	A
V_{GES}	Gate-Emitter Voltage	±30	±30	V
t_{SC}	Short circuit withstand time V_{GE}=15V, V_{CC}≤400V, Allowed number of short circuits<1000,Times between short circuits: ≥ 1.0s,T_J ≤ 175°C	8		μs
P_D	Power Dissipation @T_C=25°C	300	50	W
T_{Jmax}, T_{stg}	Operating Junction and Storage Temperature Range	175, –55 to 175		℃
T_L	Maximum Temperature for Soldering	260		℃

3. Thermal characteristics

Symbol	Parameter	TO-3PN/TO-247	TO-3PF	Units
$R_{θJC}$	Junction-to-Case (IGBT)	0.5	3.0	℃/W
$R_{θJC}$	Junction-to-Case (Diode)	0.65	1.6	℃/W
$R_{θJA}$	Junction-to-Ambient	40	40	℃/W

4. Electrical Characteristics

at T_C = 25°C, unless otherwise specified

Static Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
V_{CES}	Collector-Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 250μA	650	--	--	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE} = 15V,I_C = 50A T_J=25℃ T_J=125℃ T_J=175℃	-- -- --	1.60 1.85 2.00	2.0 -- --	V

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$V_{GE(TH)}$	Gate Threshold Voltage	V_{CE} = V_{GE}, I_C = 1mA	4.7	5.5	6.2	V
V_F	Diode Forward Voltage	I_F=50A T_J=25℃ T_J=125℃ T_J=175℃	-- -- --	2.30 1.95 1.80	3.00 -- --	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE} = 650V, V_{GE} = 0V	--	--	35	μA
$I_{GES(F)}$	Gate-Emitter Forward Leakage Current	V_{GE} = +30V	--	--	200	nA
$I_{GES(R)}$	Gate-Emitter Reverse Leakage Current	V_{GE} = -30V	--	--	-200	nA
Pulse width tp≤300μs, δ≤2%						

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{GE}=0V V_{CE}=25V f =1.0MHz	--	2109	--	pF
C_{oss}	Output Capacitance		--	158	--	
C_{rss}	Reverse Transfer Capacitance		--	24	--	
Q_G	Gate charge	V_{CC}=520V I_{CE}=50A V_{GE}=15V	--	106	--	nC
Q_{GC}	Gate-emitter charge		--	53	--	
Q_{GE}	Gate-collector charge		--	22	--	
$I_{C(SC)}$	Short circuit collector current Max.1000 short circuits, Times between short circuits: ≥ 1.0s	V_{GE}=15.0V, V_{CC}≤400V, t_{SC}≤8us, T_J≤175℃		250		A

IGBT Switching Characteristics, at T_J=25℃

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$t_{d(on)}$	Turn-on Delay Time	I_C =50A V_{CE} = 400V V_{GE} = 15V R_G =5Ω T_J=25°C Inductive Load	--	22	--	ns
t_r	Rise Time		--	44	--	
$t_{d(off)}$	Turn-Off Delay Time		--	102	--	
t_f	Fall Time		--	59	--	
E_{on}	Turn-On Switching Loss		--	0.98	--	mJ
E_{off}	Turn-Off Switching Loss		--	0.81	--	
E_{ts}	Total Switching Loss		--	1.79	--	

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IGBT Switching Characteristics, at T_J=175℃

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$t_{d(on)}$	Turn-on Delay Time	I_C =50A V_{CE} = 400V V_{GE} = 15V R_G =5Ω T_J=175°C Inductive Load	--	22	--	ns
t_r	Rise Time		--	41	--	
$t_{d(off)}$	Turn-Off Delay Time		--	182	--	
t_f	Fall Time		--	115	--	
E_{on}	Turn-On Switching Loss		--	1.06	--	mJ
E_{off}	Turn-Off Switching Loss		--	1.48	--	
E_{ts}	Total Switching Loss		--	2.54	--	

Diode Characteristics, at T_J=25℃

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
T_{rr}	Reverse Recovery Time	I_F=25A, di/dt=200A/μs, T_J=25°C	--	40	--	ns
Q_{rr}	Reverse Recovery Charge		--	86	--	nC
I_{rrm}	Reverse Recovery Current		--	3.0	--	A
T_{rr}	Reverse Recovery Time	I_F=50A, di/dt=200A/μs, T_J=25°C	--	48	--	ns
Q_{rr}	Reverse Recovery Charge		--	103	--	nC
I_{rrm}	Reverse Recovery Current		--	3.7	--	A

Diode Characteristics, at T_J=175℃

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
T_{rr}	Reverse Recovery Time	I_F=25A, di/dt=200A/μs, T_J=175°C	--	120	--	ns
Q_{rr}	Reverse Recovery Charge		--	136	--	nC
I_{rrm}	Reverse Recovery Current		--	3.9	--	A
T_{rr}	Reverse Recovery Time	I_F=50A, di/dt=200A/μs, T_J=175°C	--	160	--	ns
Q_{rr}	Reverse Recovery Charge		--	175	--	nC
I_{rrm}	Reverse Recovery Current		--	4.8	--	A

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5. Characteristics Curves

Figure 1. Forward Bias Safe Operating Area for TO247/TO3PN

Figure 2. Forward Bias Safe Operating Area for TO3PF

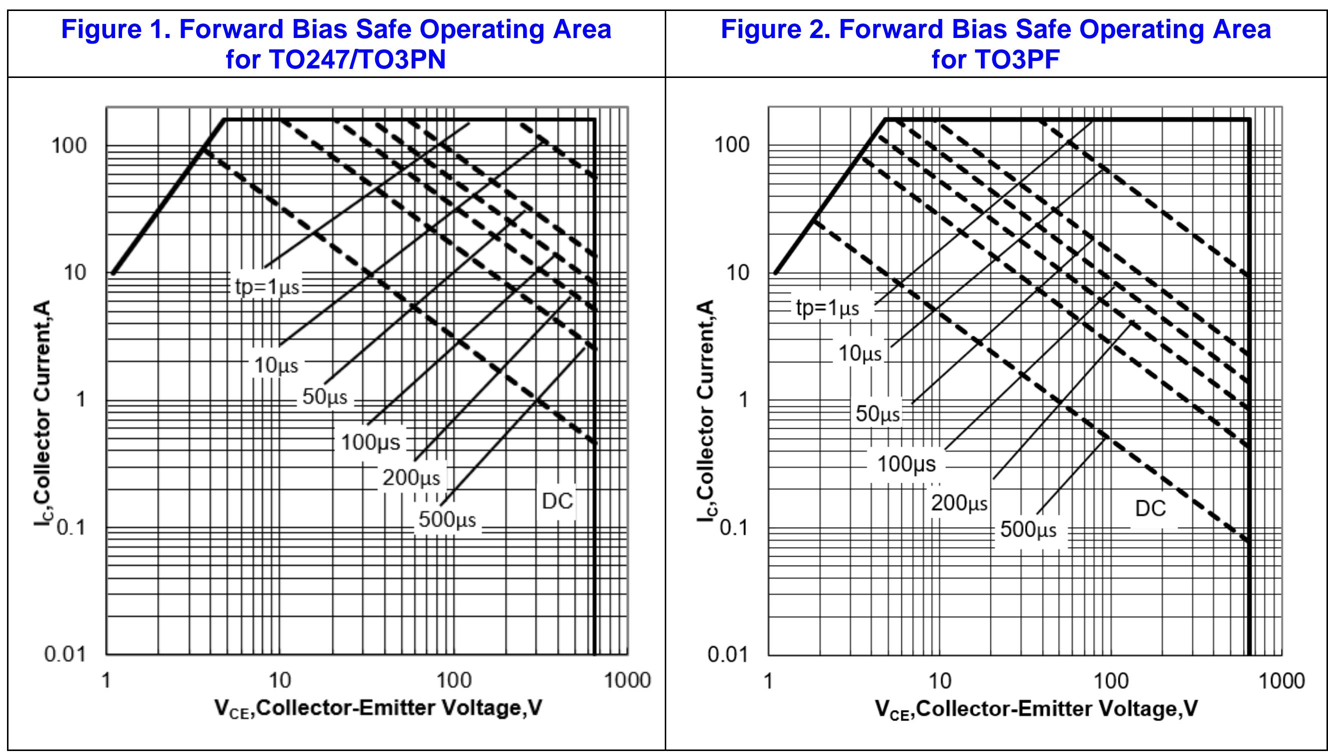
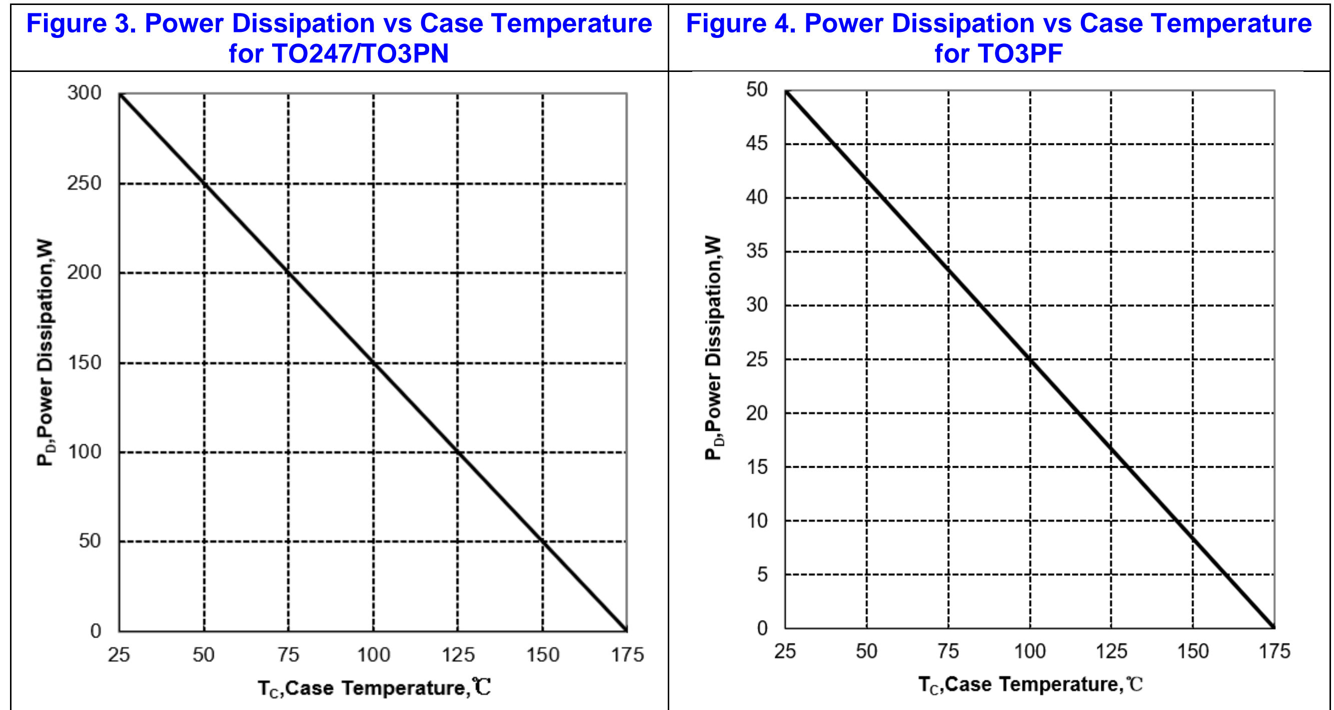


Figure 3. Power Dissipation vs Case Temperature for TO247/TO3PN

Figure 4. Power Dissipation vs Case Temperature for TO3PF



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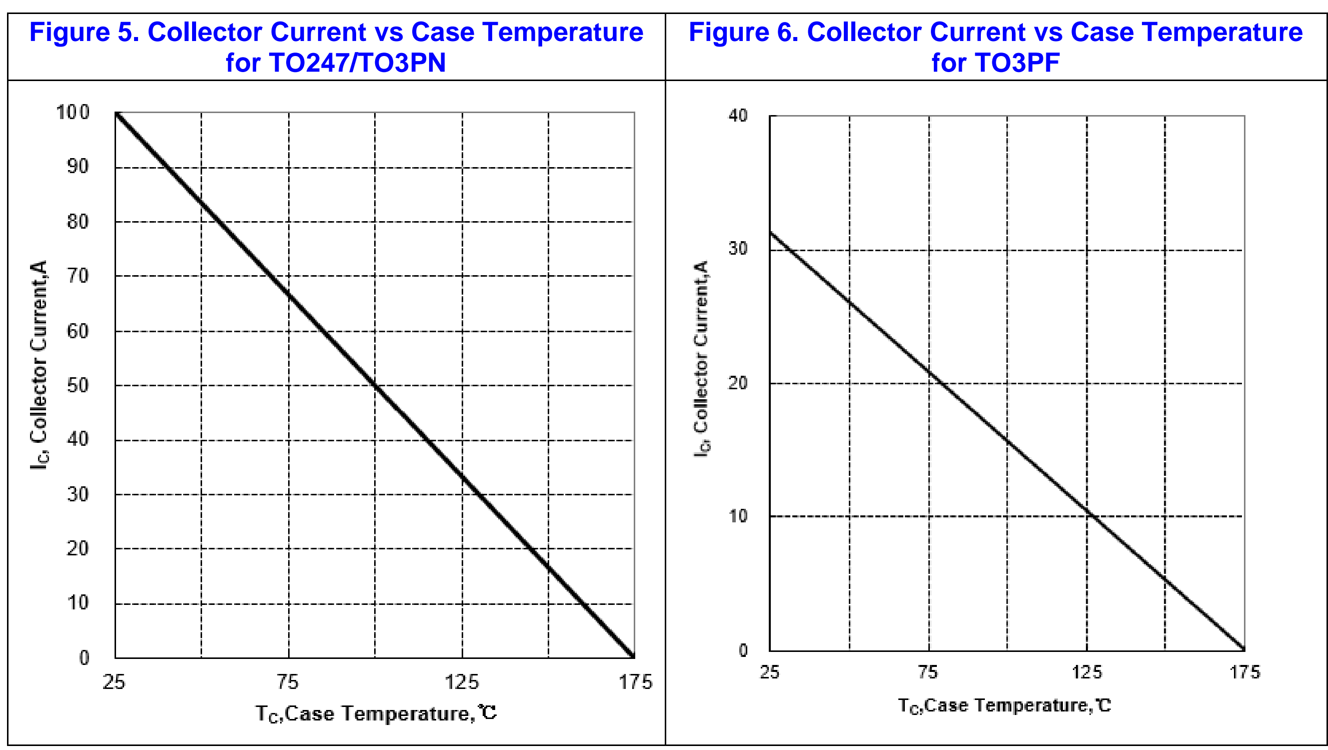

Figure 5. Collector Current vs Case Temperature for TO247/TO3PN

Figure 6. Collector Current vs Case Temperature for TO3PF

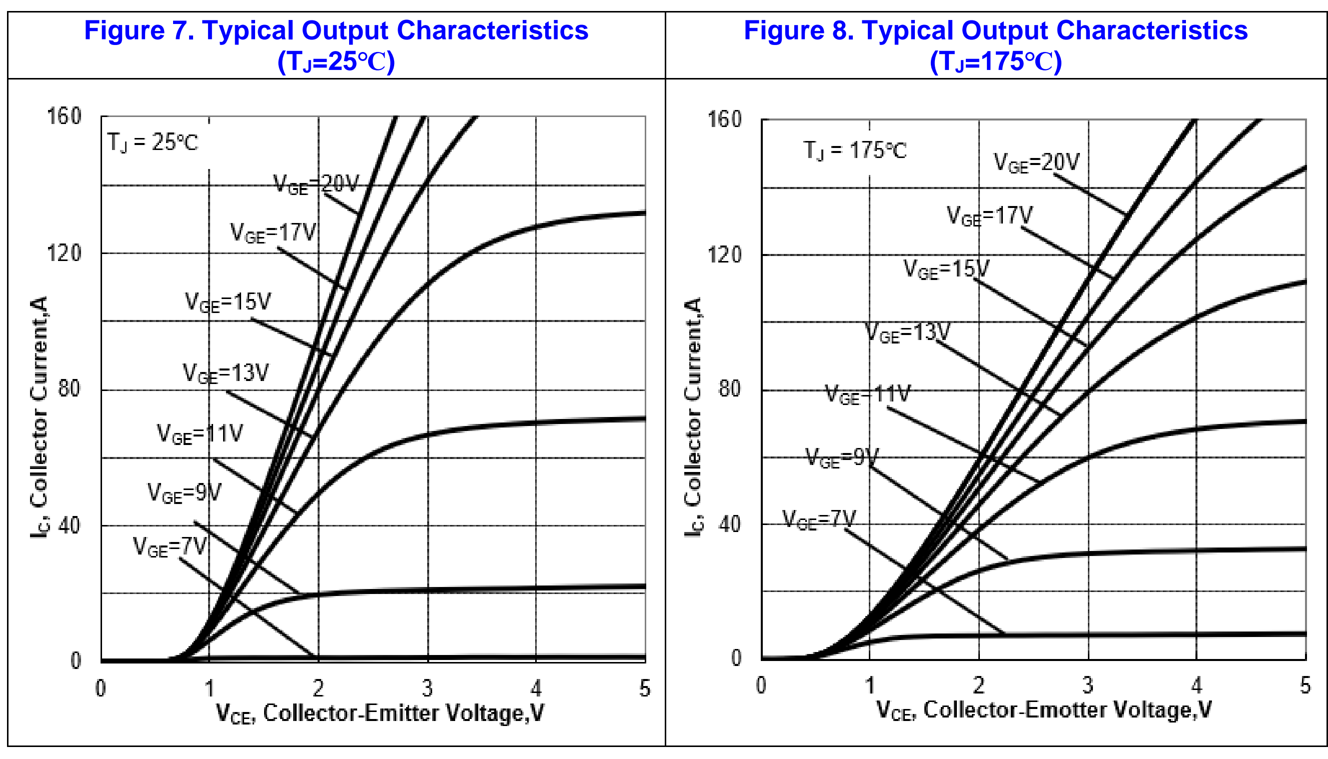

Figure 7. Typical Output Characteristics (T_J=25℃)

Figure 8. Typical Output Characteristics (T_J=175℃)

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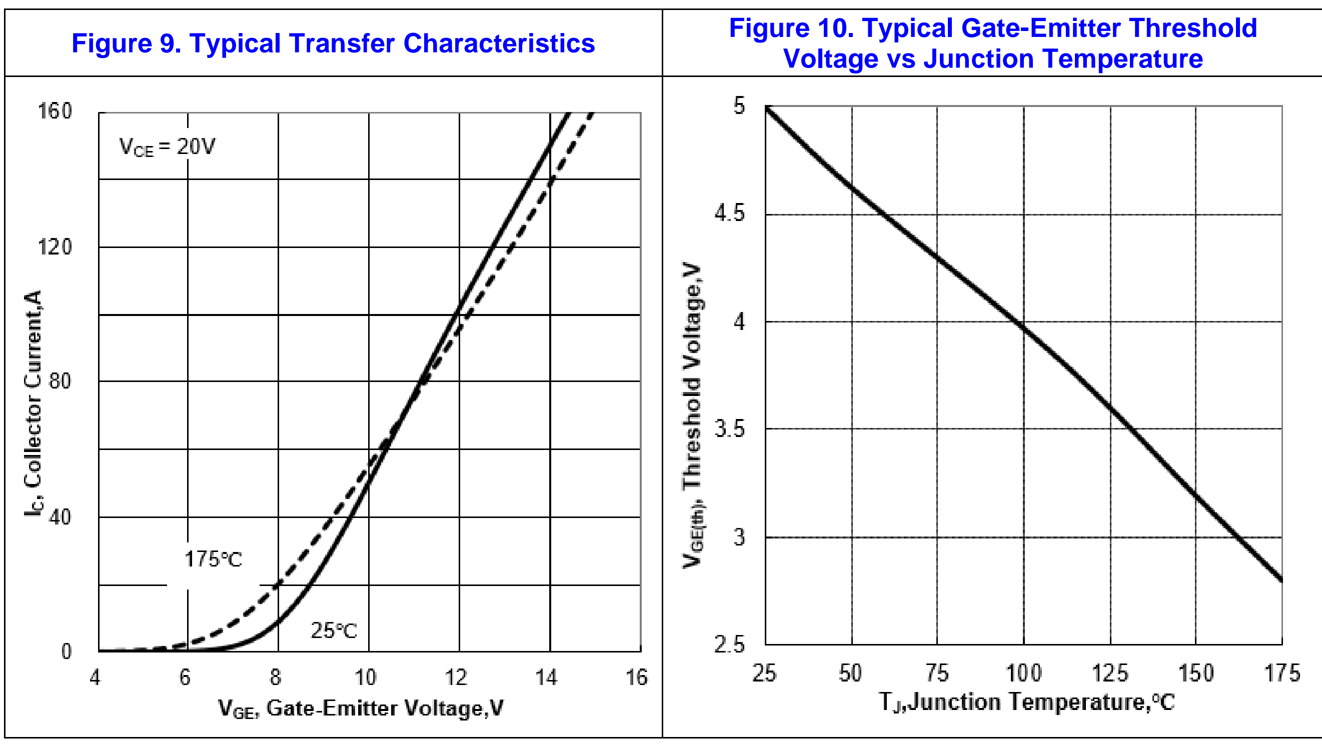

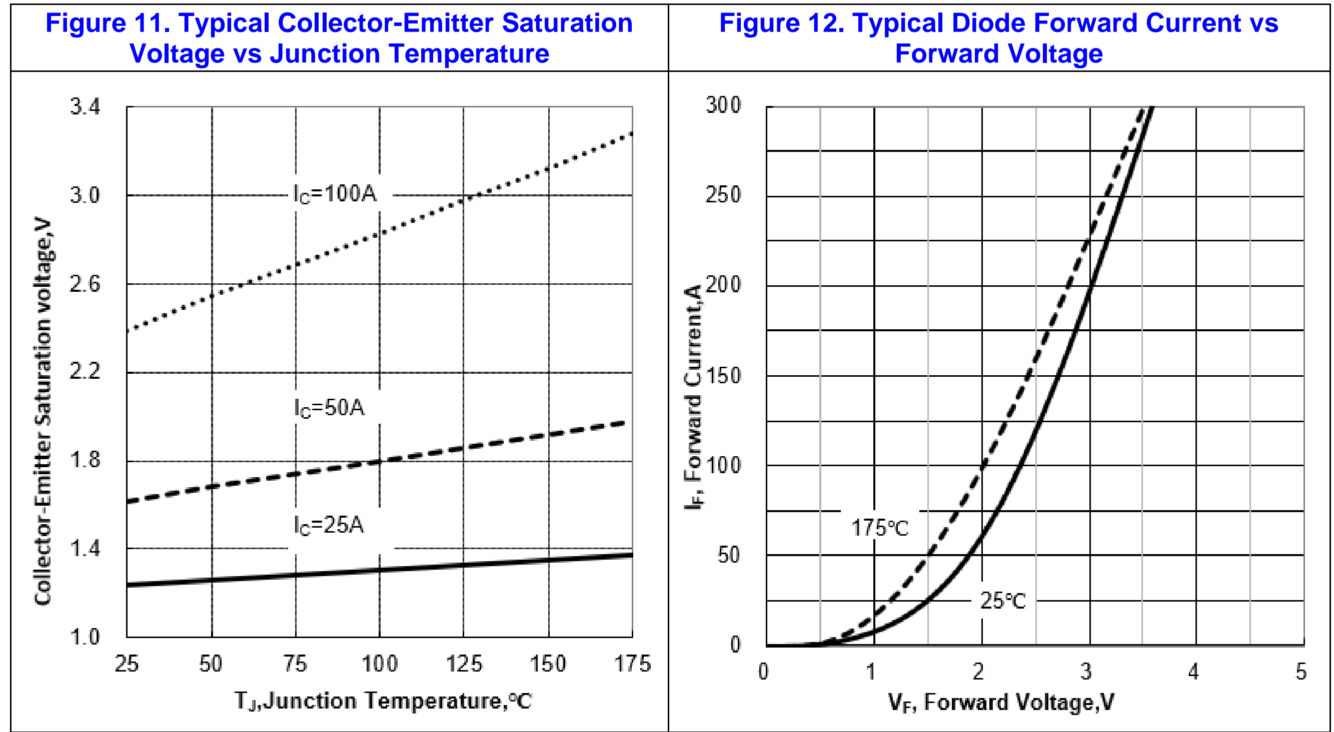

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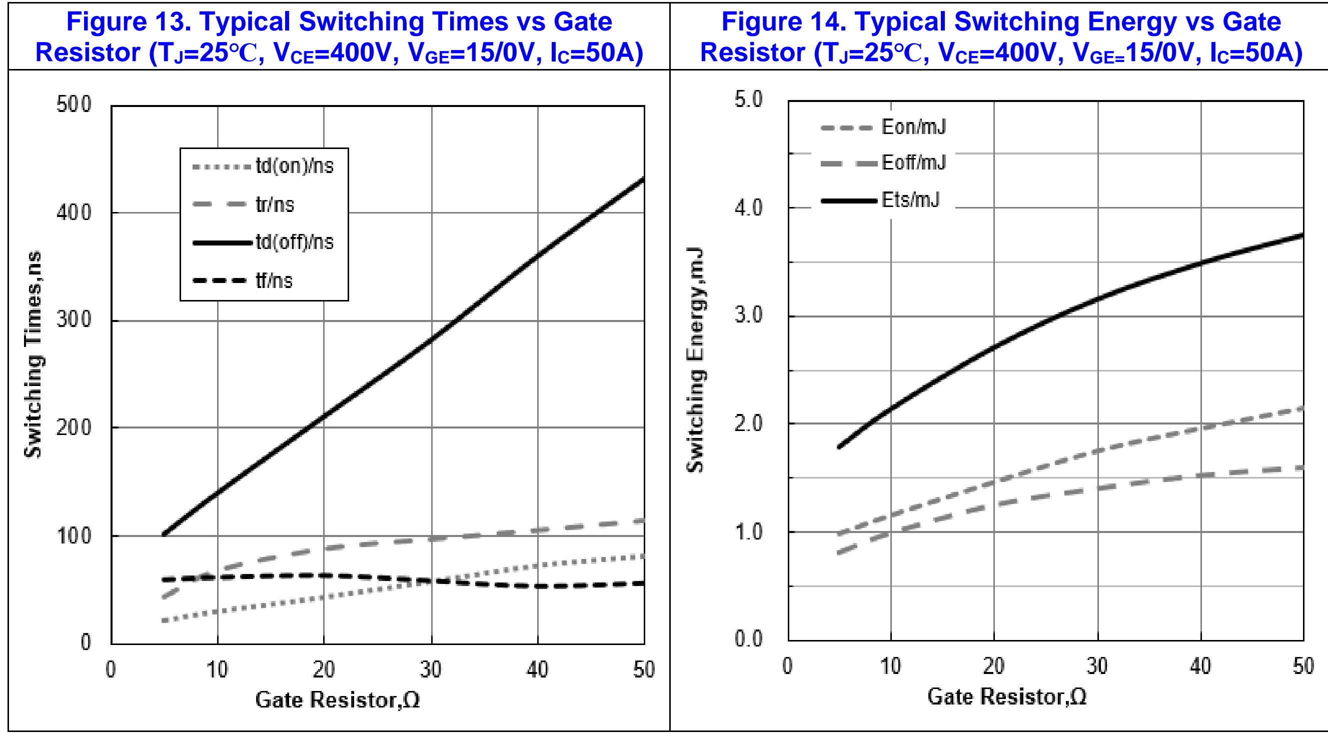

Figure 13. Typical Switching Times vs Gate Resistor (T_J=25℃, V_{CE}=400V, V_{GE}=15/0V, I_C=50A)

Figure 14. Typical Switching Energy vs Gate Resistor (T_J=25℃, V_{CE}=400V, V_{GE}=15/0V, I_C=50A)

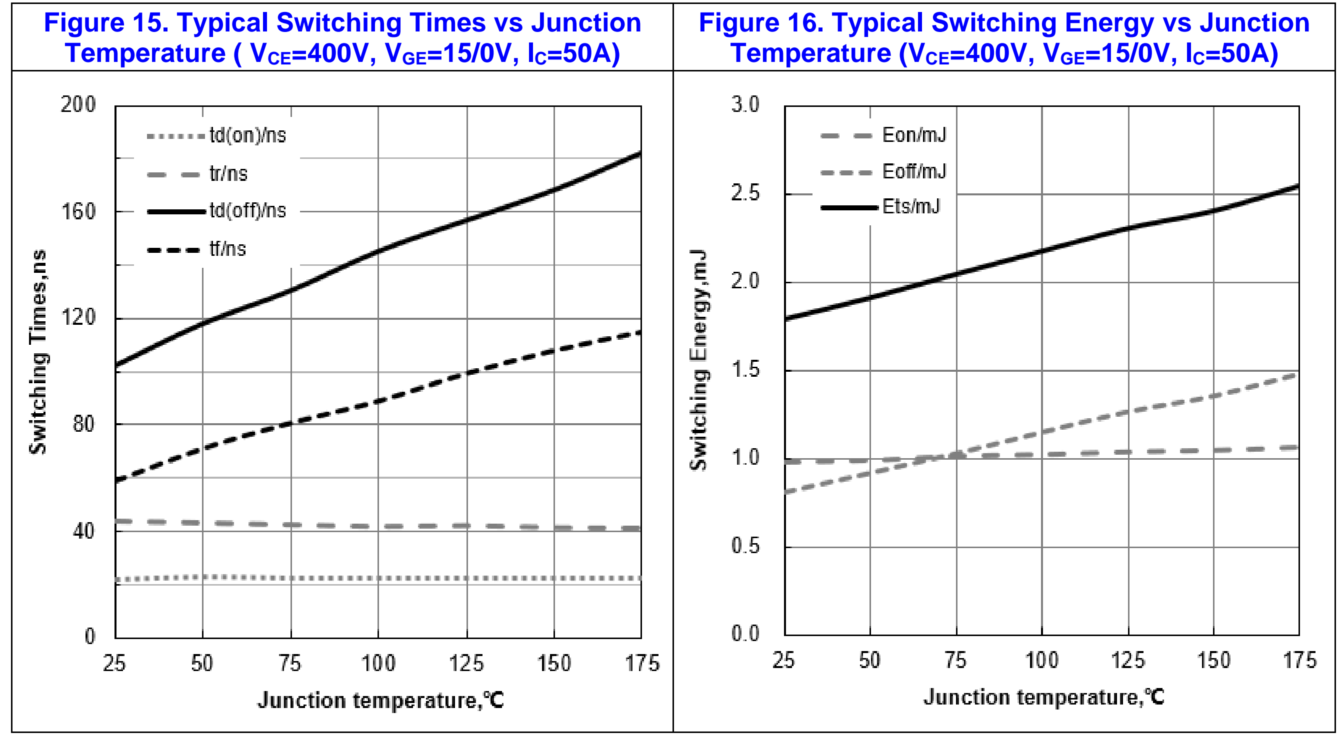

Figure 15. Typical Switching Times vs Junction Temperature (V_{CE}=400V, V_{GE}=15/0V, I_C=50A)

Figure 16. Typical Switching Energy vs Junction Temperature (V_{CE}=400V, V_{GE}=15/0V, I_C=50A)

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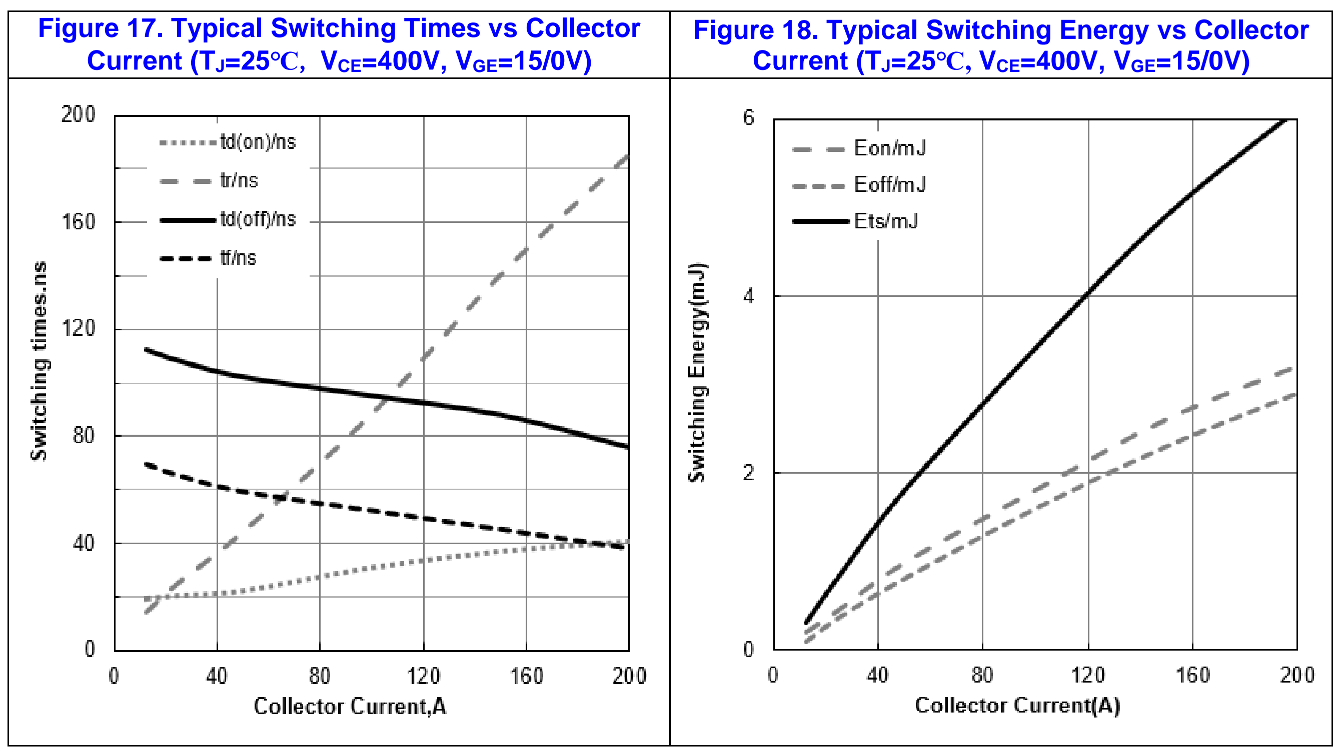

Figure 17. Typical Switching Times vs Collector Current (T_J=25℃, V_{CE}=400V, V_{GE}=15/0V)

Figure 18. Typical Switching Energy vs Collector Current (T_J=25℃, V_{CE}=400V, V_{GE}=15/0V)

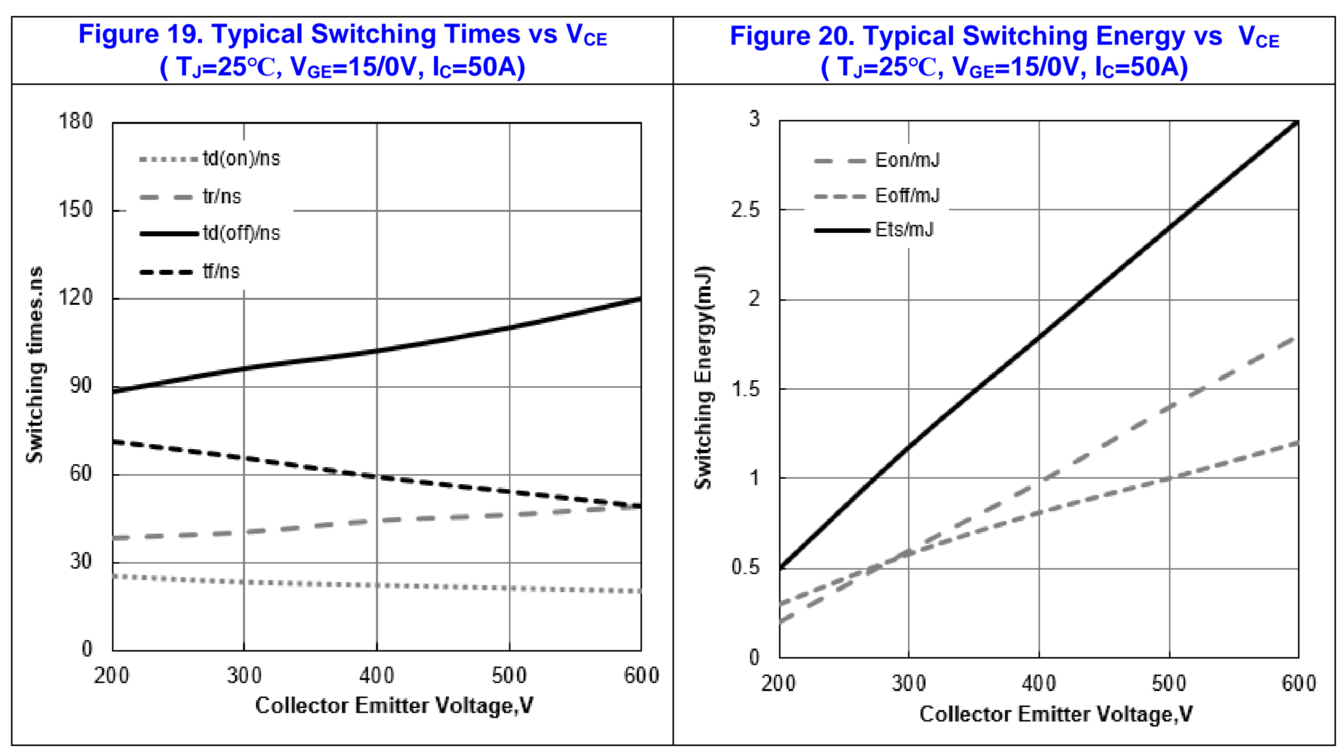

Figure 19. Typical Switching Times vs V_{CE} (T_J=25℃, V_{GE}=15/0V, I_C=50A)

Figure 20. Typical Switching Energy vs V_{CE} (T_J=25℃, V_{GE}=15/0V, I_C=50A)

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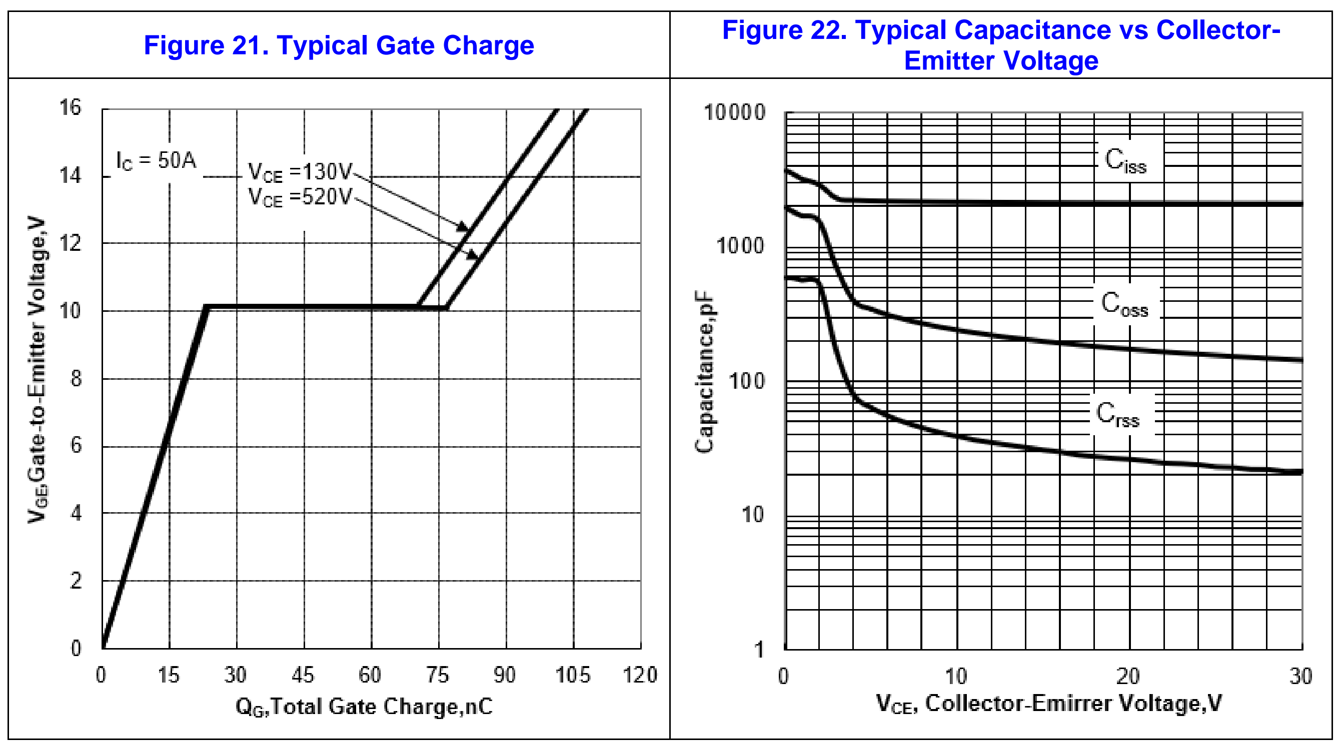

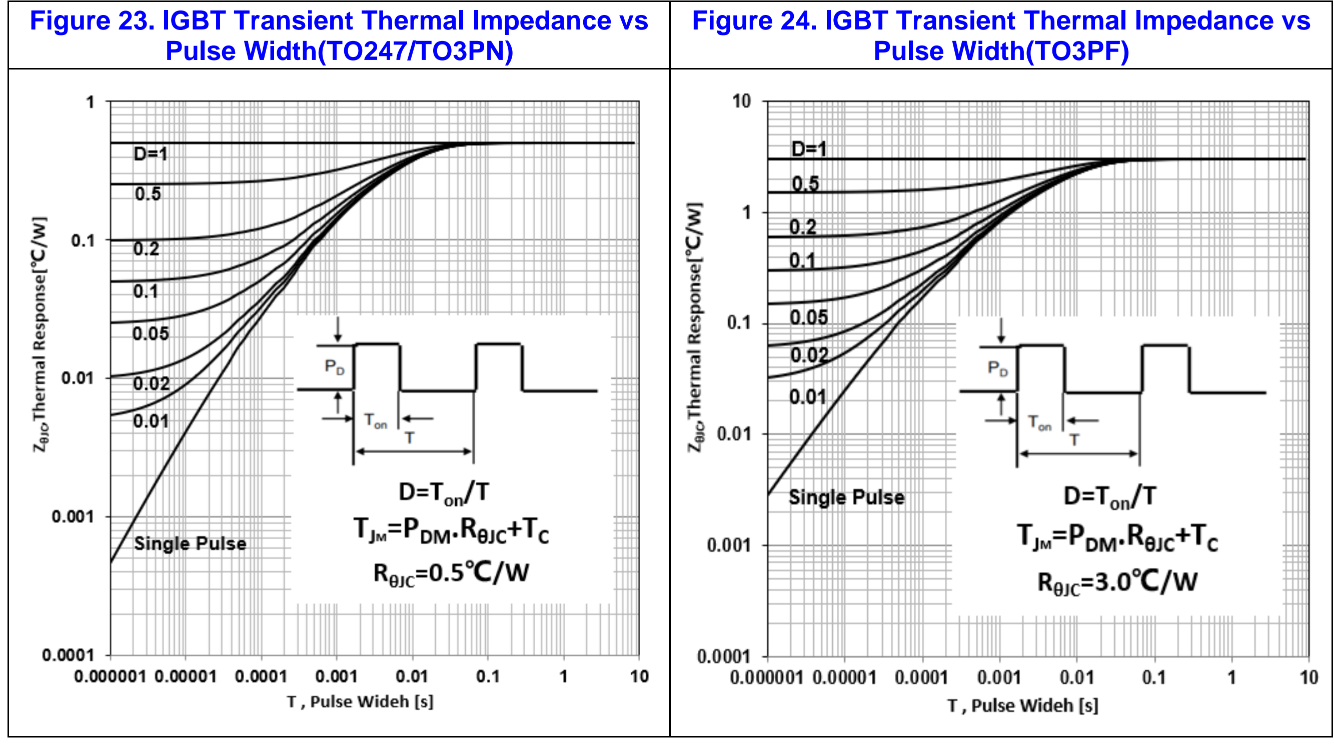

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Figure 25. Diode Transient Thermal Impedance vs Pulse Width(TO247/TO3PN)	Figure 26. Diode Transient Thermal Impedance vs Pulse Width (TO3PF)
$D=T_{on}/T$ $T_{JM}=P_{DM}\cdot R_{\theta JC}+T_C$ $R_{\theta JC}=0.65℃/W$ D=1, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, Single Pulse $Z_{\theta JC}$,Thermal Response[℃/W] T , Pulse Wideh [s]	$D=T_{on}/T$ $T_{JM}=P_{DM}\cdot R_{\theta JC}+T_C$ $R_{\theta JC}=1.60℃/W$ D=1, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, Single Pulse $Z_{\theta JC}$,Thermal Response[℃/W] T , Pulse Wideh [s]

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6. Test Circuit and Waveform

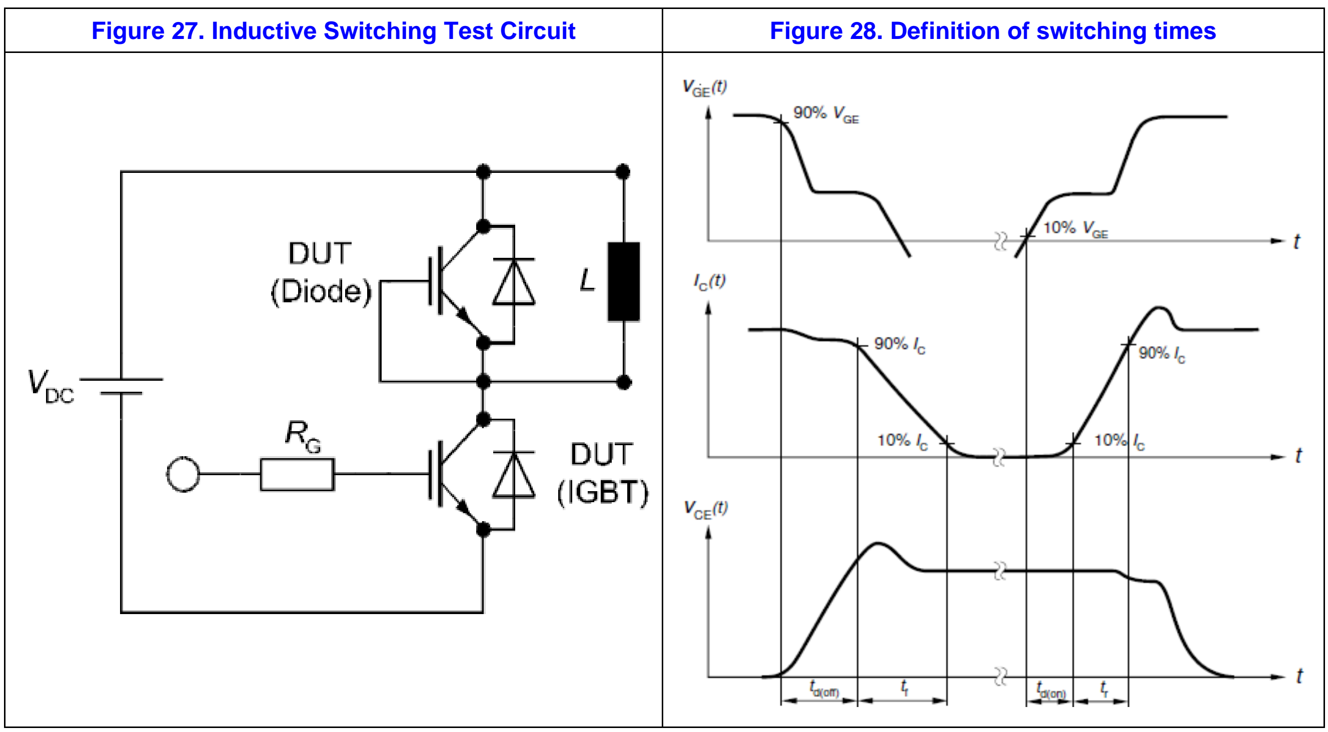

Figure 27. Inductive Switching Test Circuit

Figure 28. Definition of switching times

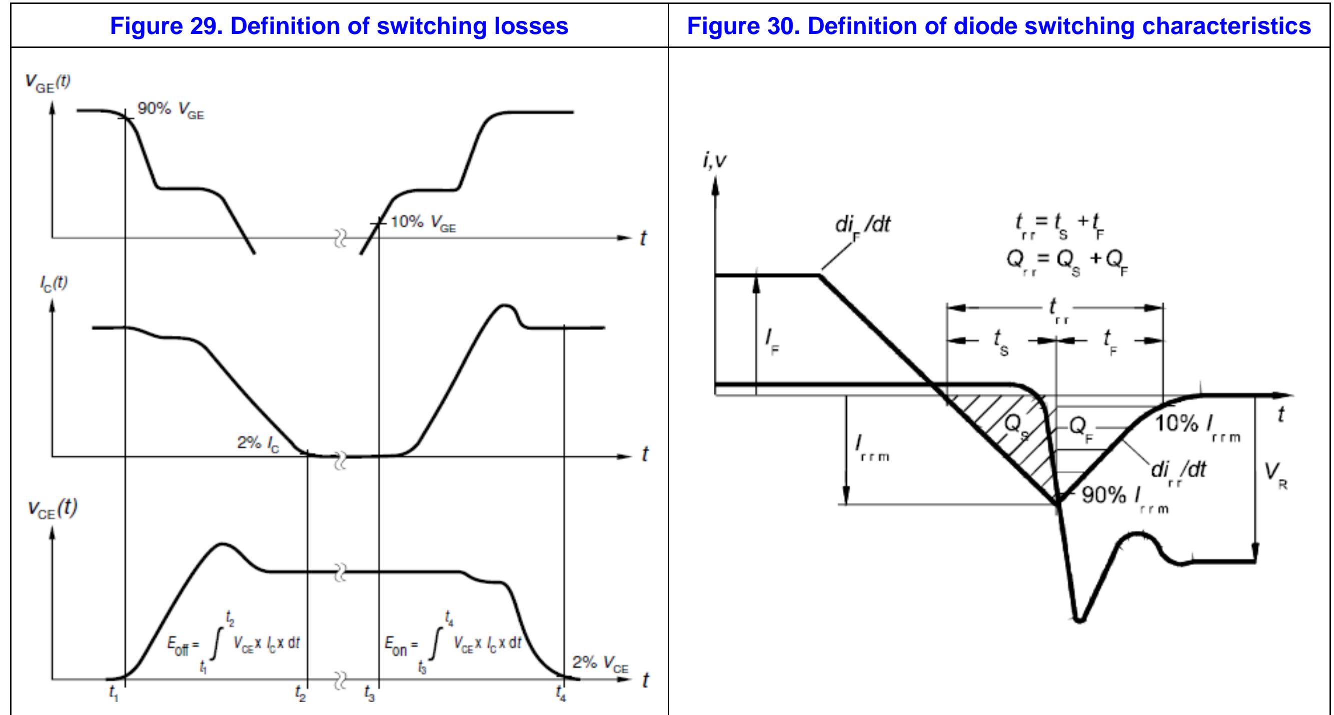

Figure 29. Definition of switching losses

Figure 30. Definition of diode switching characteristics

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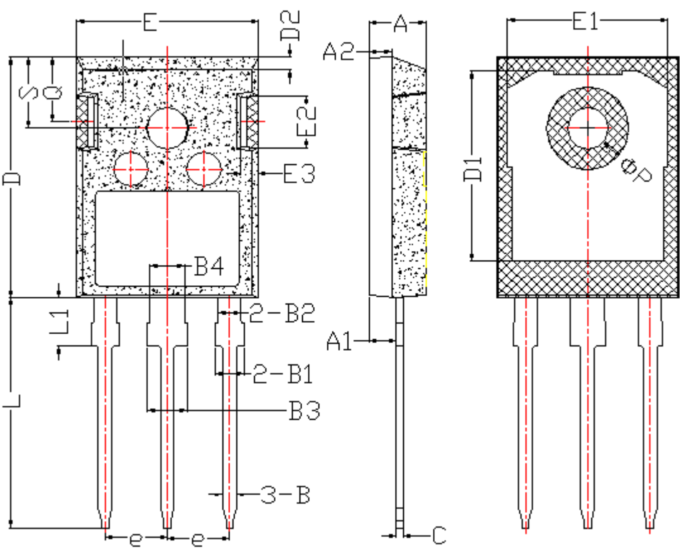
7. Package Description



TO-247 Package

Items	Values(mm)	
	MIN	MAX
A	4.90	5.16
A1	2,27	2.53
A2	1.85	2.11
B	1.07	1.33
B1	1.90	2.41
B2	1.75	2.15
B3	2.87	3.38
B4	2.87	3.13
C	0.55	0.68
D	20.82	21.10
D1	16.25	17.65
D2	1.05	1.35
E	15.70	16.03
E1	13.10	14.15
E2	3.68	5.10
E3	1.68	2.60
e	5.44	
L	19.80	20.31
L1	4.17	4.47
ΦP	3.50	3.70
Q	5.49	6.00
S	6.04	6.30

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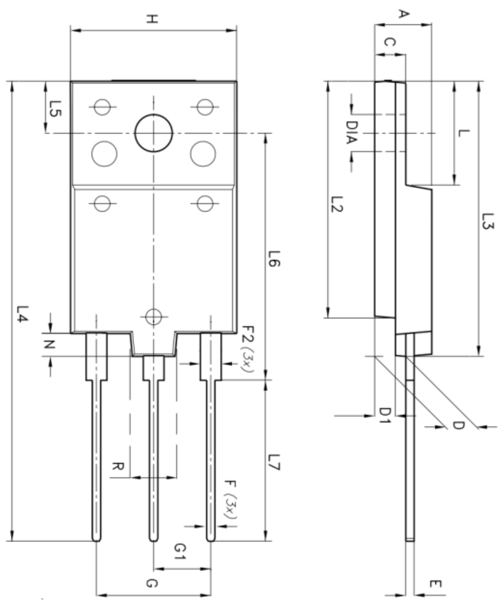

TO-3PF Package

Items	Values(mm)	
	MIN	MAX
A	5.30	5.70
C	2.80	3.20
D	3.10	3.50
D1	1.80	2.20
E	0.80	1.10
F	0.65	0.95
F2	1.80	2.20
G	10.30	11.50
G1	5.45	
H	15.30	15.70
L	9.80	10.20
L2	22.80	23.20
L3	26.30	26.70
L4	43.20	44.40
L5	4.3	4.70
L6	24.3	24.70
L7	14.6	15
N	1.8	2.2
R	3.8	4.2
Dia	3.4	3.8

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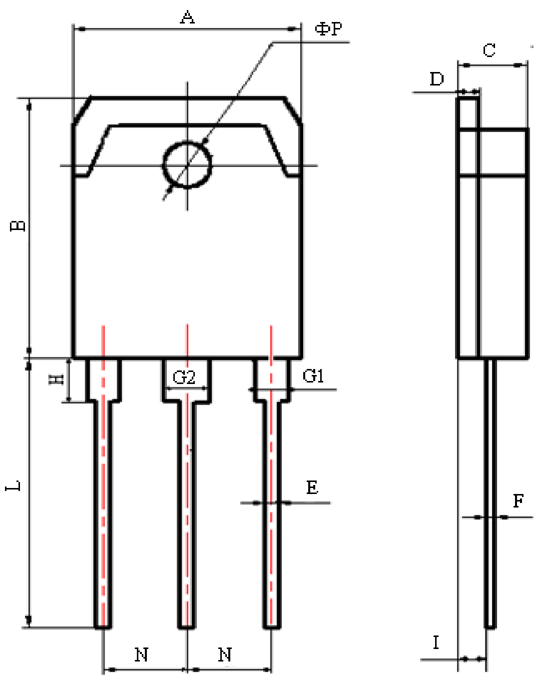

TO-3PN Package

Items	Values(mm)	
	MIN	MAX
A	15.00	16.00
B	19.20	20.60
C	4.60	5.00
D	1.40	1.60
E	0.90	1.10
F	0.50	0.70
G1	2.00	2.20
G2	3.00	3.20
H	3.00	3.70
I	1.20	1.70
	2.70	2.90
L	19.00	21.00
N	5.25	5.65
ф P	3.10	3.30

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NOTE:

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when circuit designing.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. IGBTs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. Shanghai Belling reserves the right to make changes in this specification sheet and is subject to change without prior notice.

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