

BGH65N50L1

650V 50A Trench FS IGBT



Description

The BGH65N50L1 is a Trench FS IGBT utilizing bestirpower's advanced technology, which achieves an exceptionally low gate charge. It achieves significantly higher efficiency through optimized gate charge management, while its user-friendly design offers designers advantages such as low EMI and reduced switching losses.

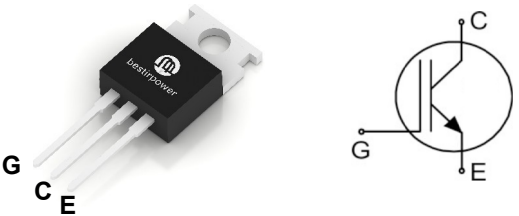
V _{CE}	I _C (T _C = 100°C)	V _{CEsat}	Q _{g,typ}
650 V	50 A	1.4 V	135 nC

Applications

- Resonant converters
- Uninterruptible power supplies
- Welding converters

Features

- Maximum junction temperature T_{Jmax} = 175°C
- Low saturation voltage V_{CEsat} = 1.4 V at T_J = 25°C
V_{CEsat} is a positive temperature coefficient, suitable for parallel applications



Absolute Maximum Ratings

Symbol	Parameter		Value max	Unit	Note
V _{CE}	Collector-emitter voltage (T _{vj} ≥ 25 °C)		650	V	
V _{GE}	Gate-emitter voltage		±20	V	
I _C	DC collector current, limited by T _{vjmax}	T _C = 25°C	80	A	
		T _C = 100°C	50	A	
I _{Cpulse}	Pulsed collector current, t _p limited by T _{vjmax}		200	A	
P _{tot}	Power Dissipation	T _C = 25°C	484	W	Fig.8
		T _C = 100°C	242		
T _J	Junction temperature range		-40 ~ 175	°C	
T _{STG}	Storage temperature range		-55 ~ 150	°C	

Thermal Resistance

Symbol	Parameter	Value	Unit
R _{thJC}	IGBT thermal resistance, junction-case	0.31	°C/W
R _{thJA}	Thermal resistance, junction-to-ambient	41.43	°C/W
T _{sold}	Soldering temperature, wave soldering only allowed at leads	260	°C

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Electrical Characteristics (T_J= 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit	Note
Statistic Characteristics								
V _{(BR)CES}	Collector-emitter Breakdown Voltage	V _{GE} =0V, I _C =200μA		650	-	-	V	
I _{CES}	Collector Cut-off Current	V _{CE} =650V, V _{GS} =0V		-	-	50	μA	
I _{GES}	Gate-emitter Leakage Current	V _{GE} =±20V, V _{GE} =0V		-	-	±100	nA	
V _{GE(TH)}	Gate Threshold Voltage	V _{CE} =V _{GE} , I _C =500μA		3.2	4.0	4.8	V	Fig.5
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} =15V I _C = 50A	T _J =25°C	-	1.4	1.75	V	Fig.4
			T _J =175°C	-	1.58	-		

Dynamic Characteristics

C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f=1MHz	-	4093	-	pF	Fig.6
C _{oes}	Output Capacitance		-	73	-		
C _{res}	Reverse Transfer Capacitance		-	19	-		

Switching Parameters

t _{d(on)}	Turn-on Delay Time	V _{CE} =400V, I _{DC} =50A, R _G =8Ω, V _{GE} =0/+15V	T _J =25°C	-	22.2	-	ns	
			T _J =150°C	-	21.8	-	ns	
t _r	Rise Time		T _J =25°C	-	30.2	-	ns	
			T _J =150°C	-	32.1	-	ns	
t _{d(off)}	Turn-off Delay Time		T _J =25°C	-	139.7	-	ns	
			T _J =150°C	-	164.7	-	ns	
t _f	Fall Time		T _J =25°C	-	63.5	-	ns	
			T _J =150°C	-	97.3	-	ns	
E _{on}	Turn-on Switching Energy		T _J =25°C	-	0.74	-	mJ	
			T _J =150°C	-	0.84	-	mJ	
E _{off}	Turn-off Switching Energy		T _J =25°C	-	0.77	-	mJ	
			T _J =150°C	-	1.17	-	mJ	

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Gate Charge Characteristics

Q_g	Gate Charge Total	$V_{CC}=520V, I_C=50A$ $V_{GE}=0 \text{ to } 15V$	-	135	-	nC	Fig.7
Q_{gc}	Gate-emitter charge		-	35	-		
Q_{ge}	Gate-collector charge		-	22	-		

Typical Performance Characteristics

Fig.1 Typical output characteristic

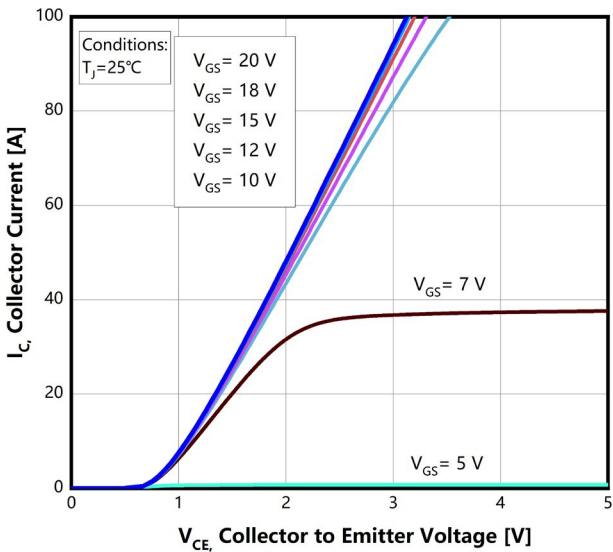


Fig.2 Typical Output characteristics

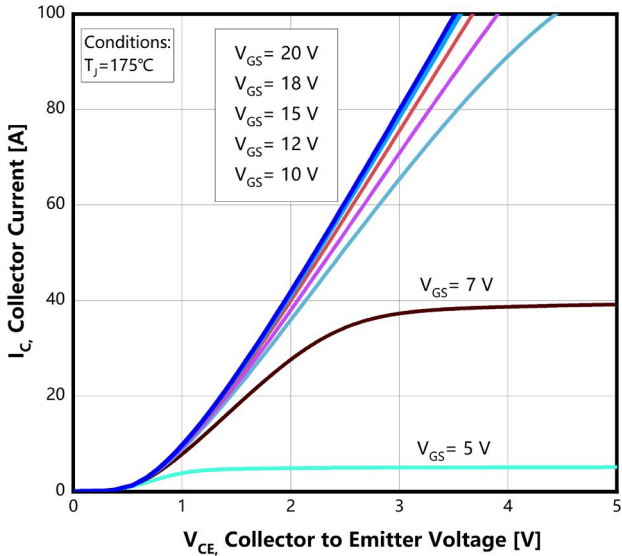


Fig3. Typical transfer characteristic

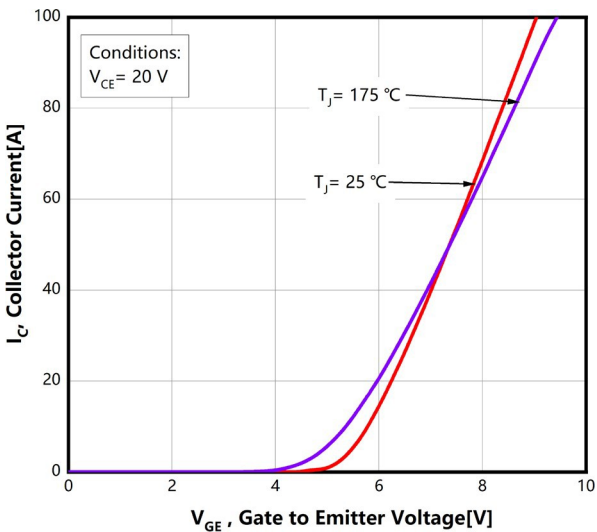
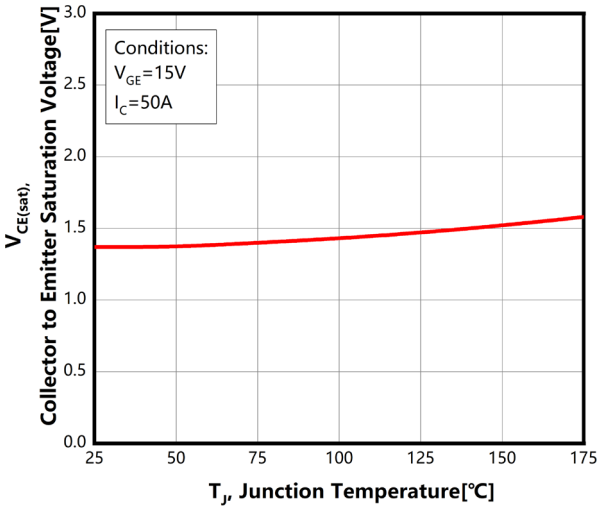


Fig4. Typical collector-emitter saturation voltage as a function of junction temperature



Typical Performance Characteristics

Figure 5. Gate-emitter threshold voltage as a function of junction temperature

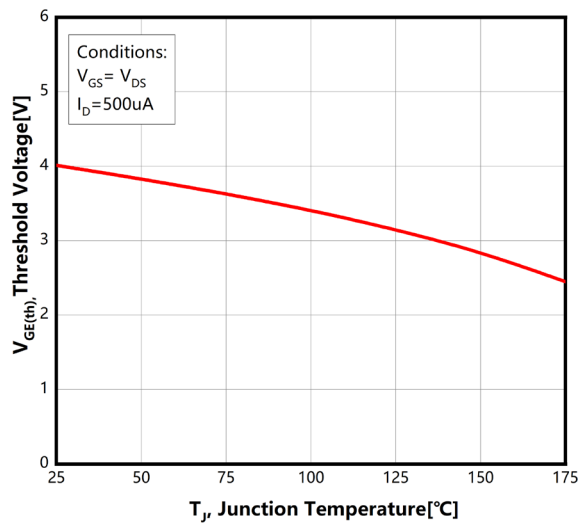


Figure 6. Typical capacitance as a function of collector-emitter voltage

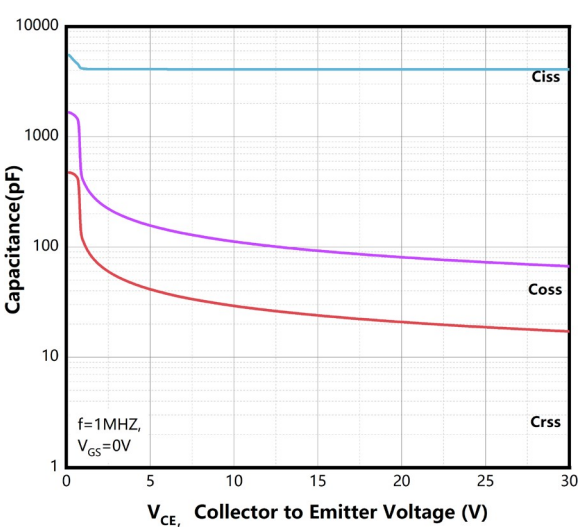


Figure 7. Typical gate charge

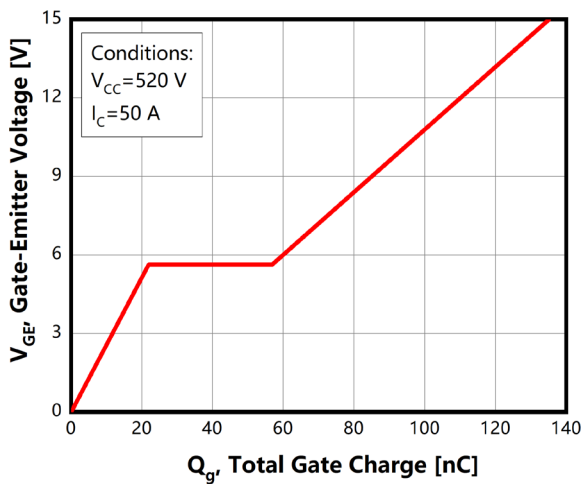
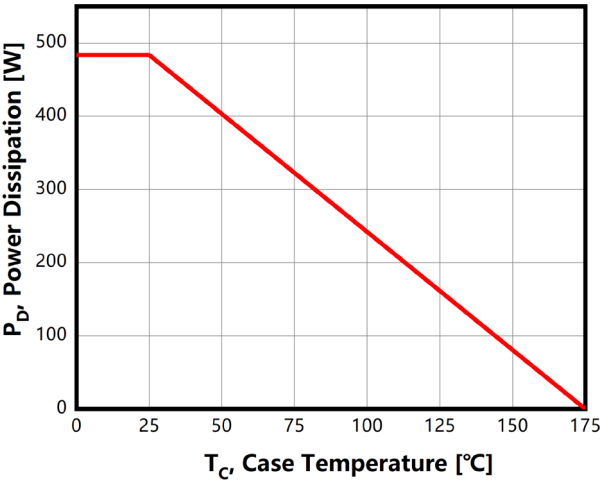
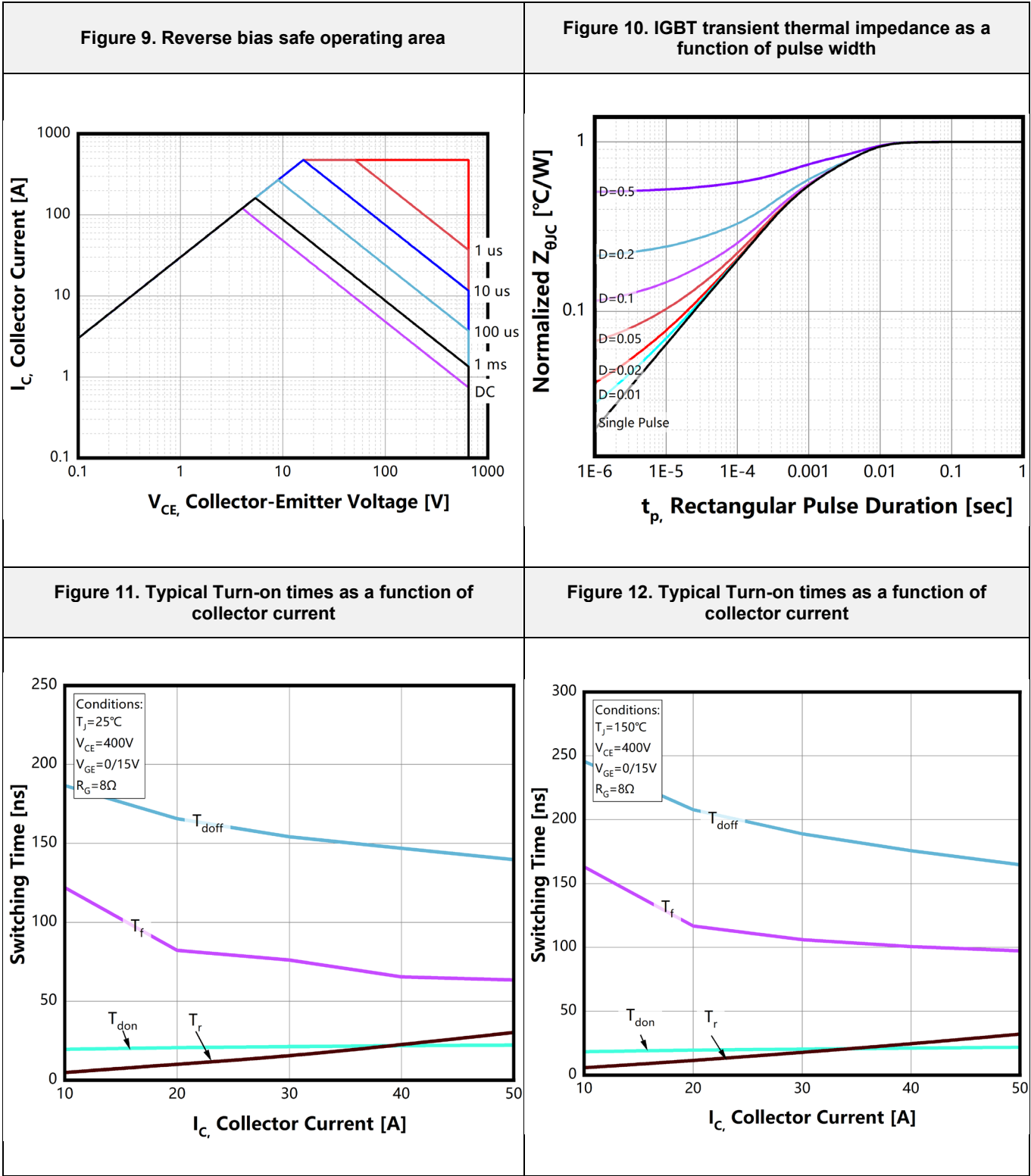


Figure 8. Power dissipation as a function of case temperature



Typical Performance Characteristics



Typical Performance Characteristics

Figure 13. Typical switching times as a function of collector emitter voltage

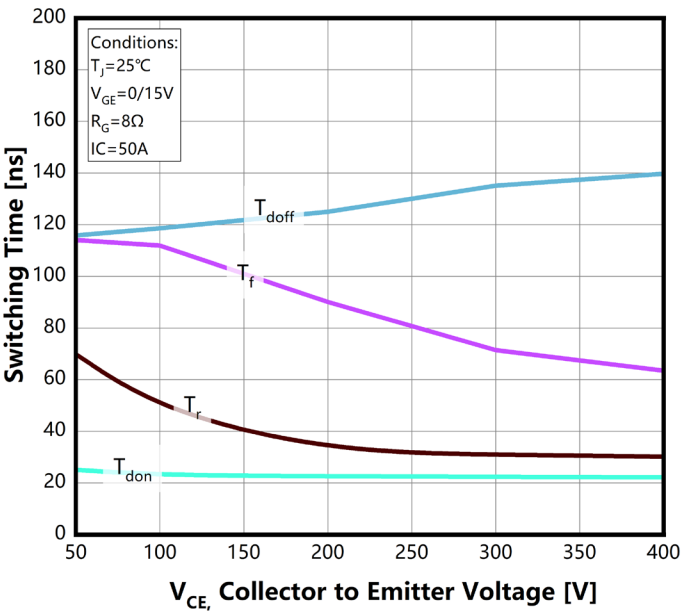


Figure 14. Typical switching times as a function of collector emitter voltage

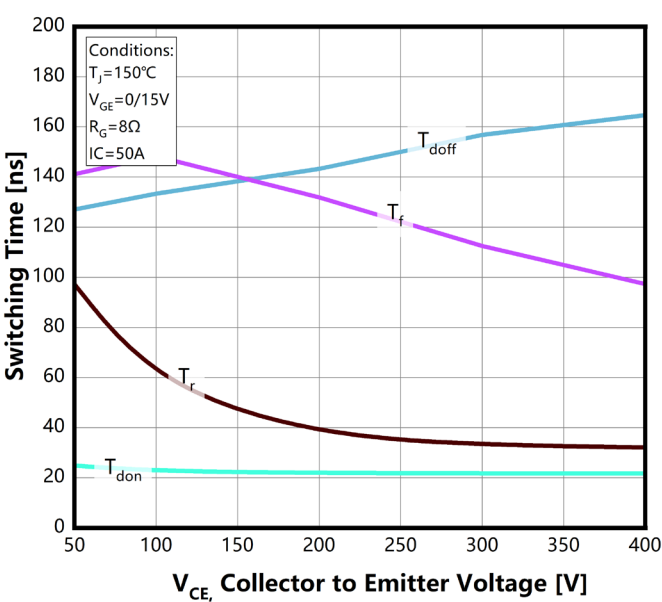


Figure 15. Typical switching times as a function of gate resistor

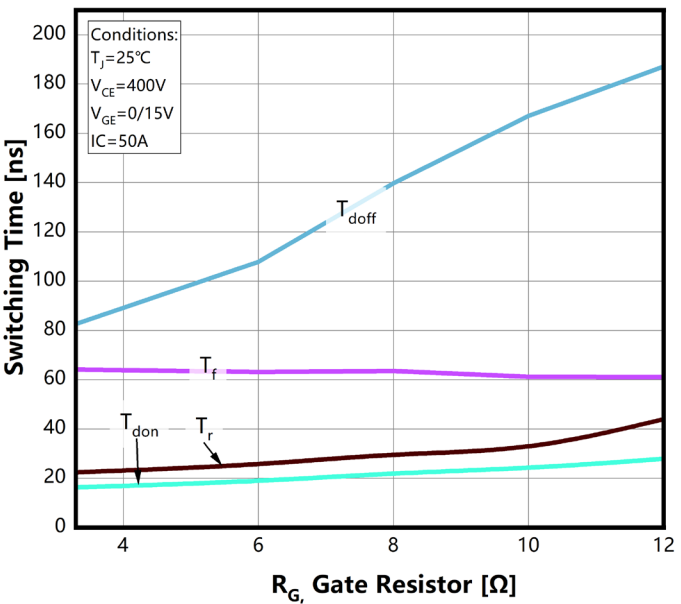
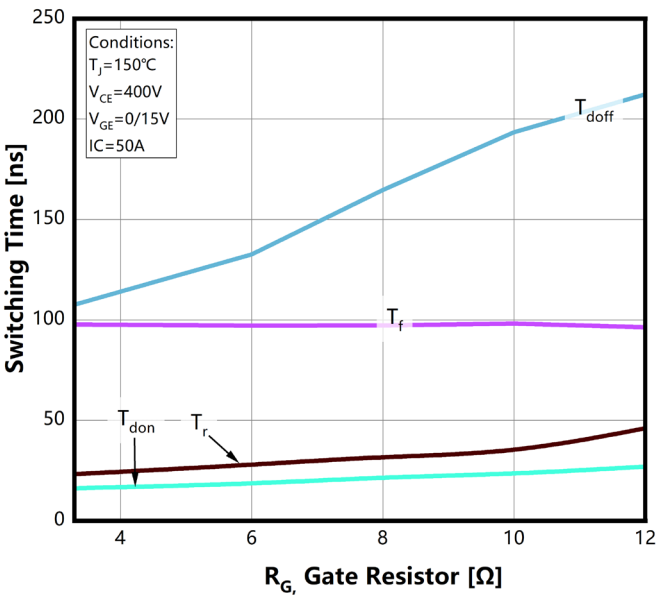


Figure 16. Typical switching times as a function of gate resistor



Typical Performance Characteristics

Figure 17. Typical switching energy losses as a function of collector current

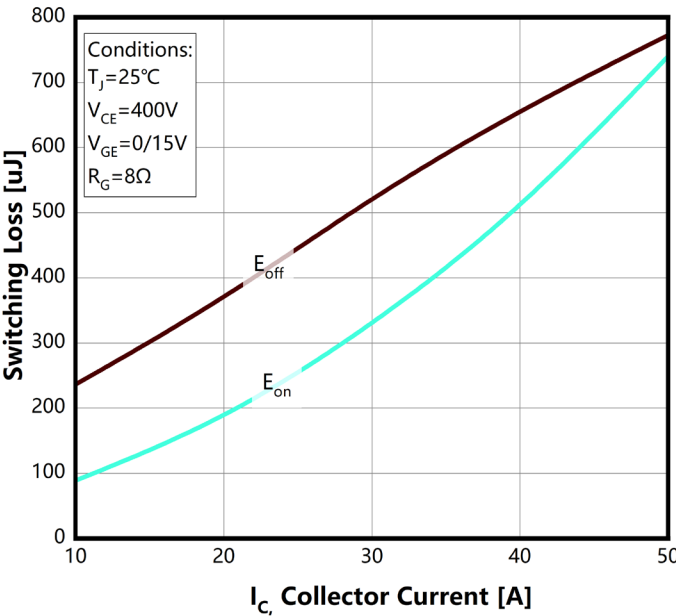


Figure 18. Typical switching energy losses as a function of collector current

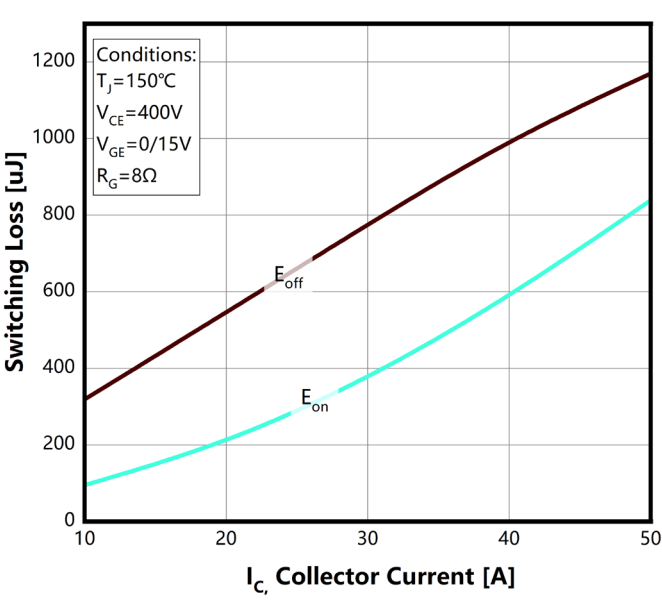


Figure 19. Typical switching energy losses as a function of collector emitter voltage

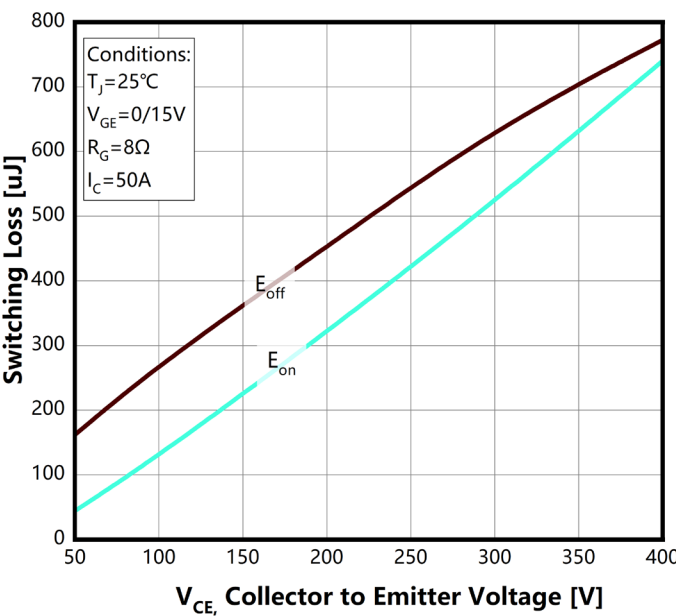
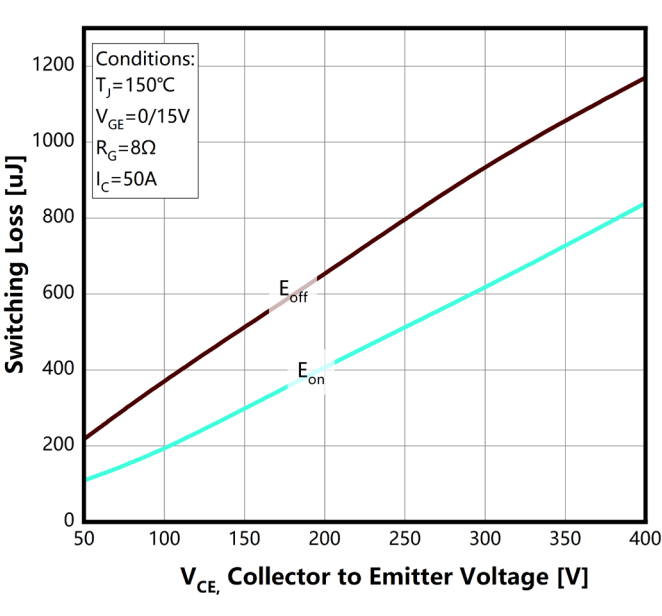


Figure 20. Typical switching energy losses as a function of collector emitter voltage



Typical Performance Characteristics

Figure 21. Typical switching energy losses as a function of gate resistor

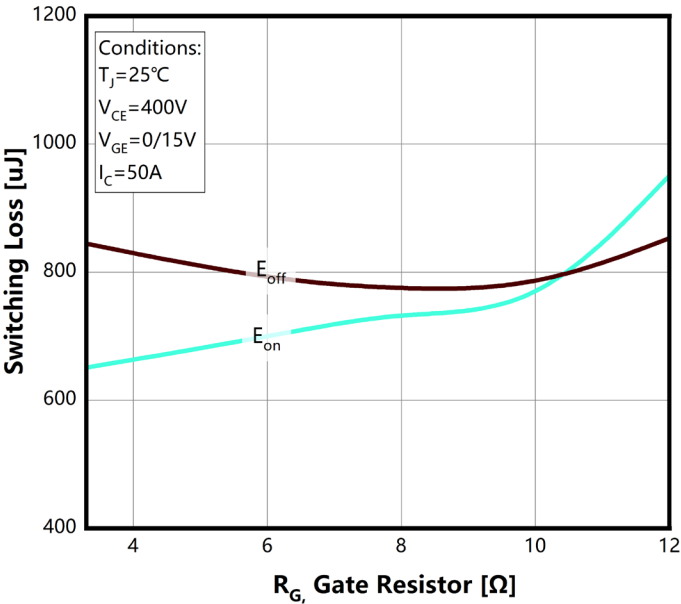


Figure 22. Typical switching energy losses as a function of gate resistor

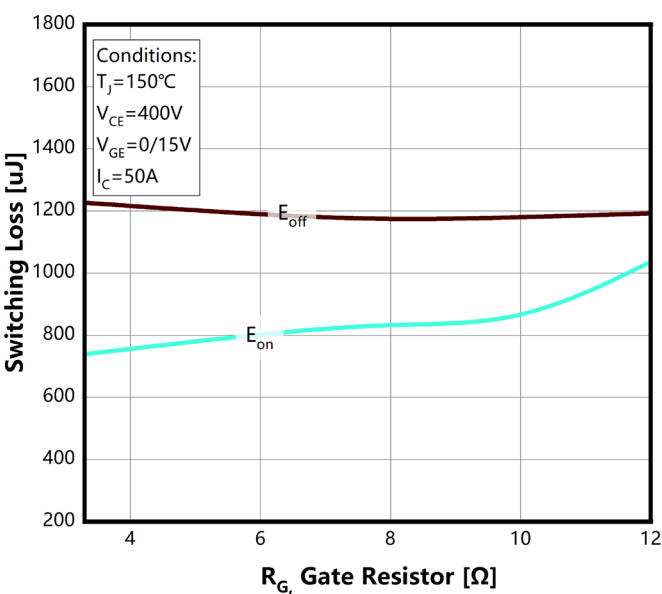


Figure 23. Typical switching times as a function of junction temperature

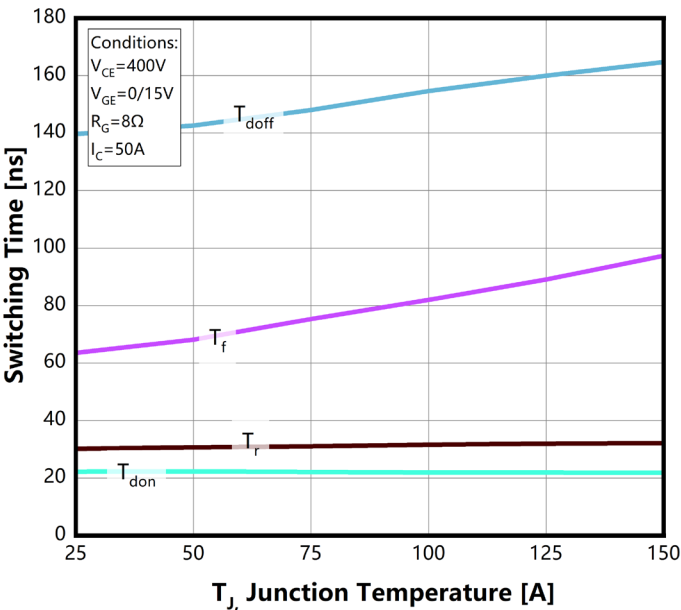
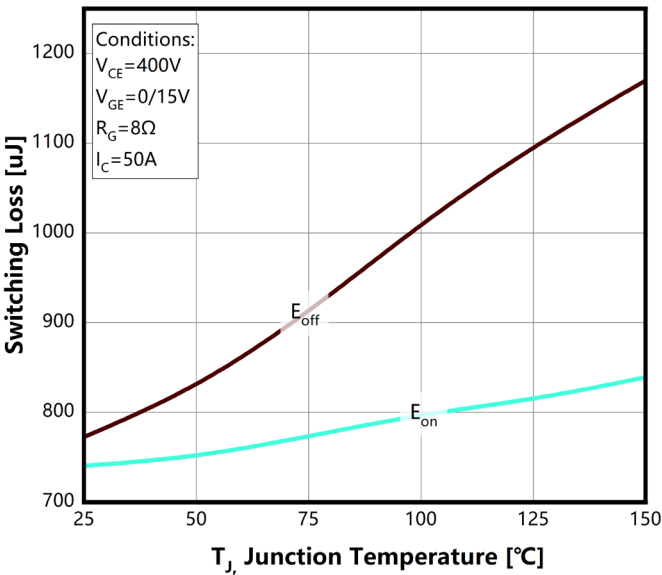


Figure 24. Typical switching energy losses as a function of junction temperature



Typical Performance Characteristics

Figure 25. Switching time test circuit and waveforms

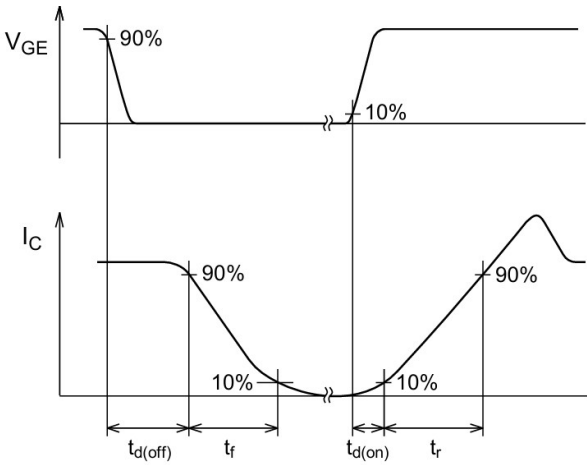
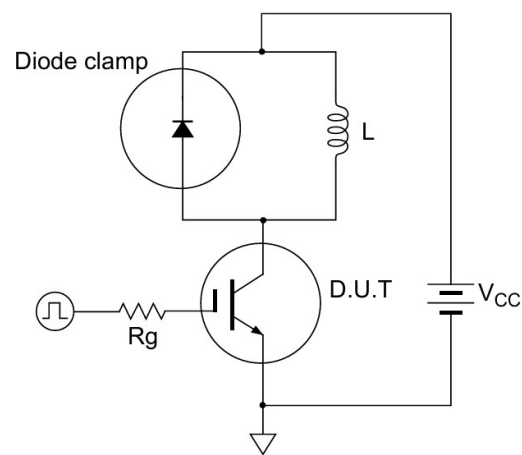
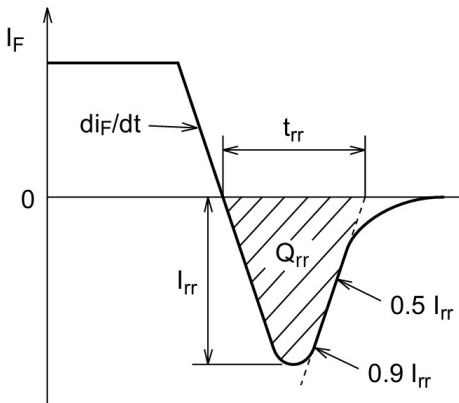
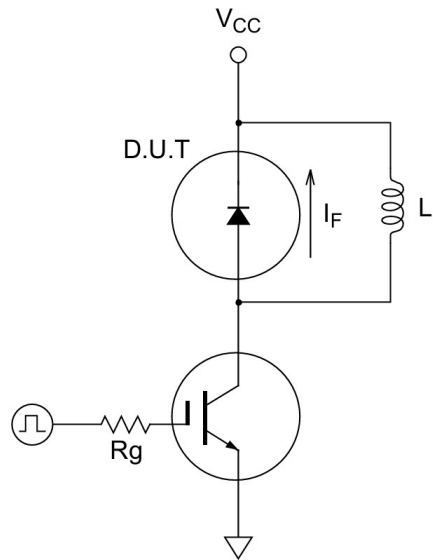
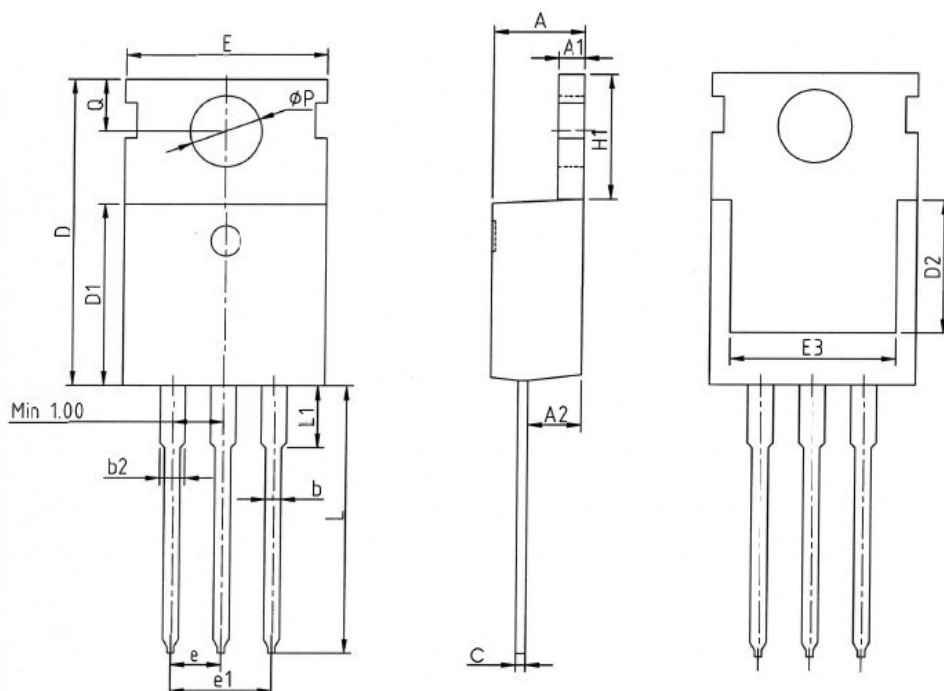


Figure 26. Reverse recovery time test circuit and waveforms



Package Outlines

TO220-3



SYMBOL	MIN	NOM	MAX
A	4.37	4.57	4.70
A1	1.25	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.45	0.50	0.60
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	6.30	7.10
E	9.70	10.00	10.30
E3	7.00	7.80	8.60
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00

* Dimensions in millimeters

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BGH65N50L1	BGH65N50L1	TO220	Tube	50 units

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