BGH65N50L1

650V 50A Trench FS IGBT

bestirpower

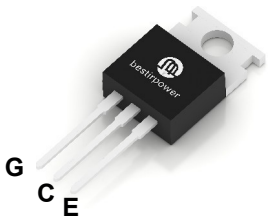
Description

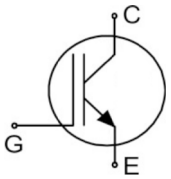
The BGH65N50L1 is a Trench FS IGBT utilizing bestirpower's advanced technology, which achieves an exceptionally low gate charge.
It achieves significantly higher efficiency through optimized gate charge management, while its user-friendly design offers designers advantages such as low EMI and reduced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

V_{CE}	$I_{C\ (TC = 100°C)}$	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

RoHS compliant

HF

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℃	80	A	
		T_C = 100℃	50	A	
I_{Cpulse}	Pulsed collector current, t_p limited by T_{vjmax}		200	A	
P_{tot}	Power Dissipation	T_C = 25℃	484	W	Fig.8
		T_C = 100℃	242		
T_J	Junction temperature range		-40 ~ 175	℃	
T_{STG}	Storage temperature range		-40 ~ 175	℃	

Thermal Resistance

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

Electrical Characteristics (T_J= 25℃ 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℃	-	1.4	1.75	V	Fig.4
			T_J=175℃	-	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℃	-	22.2	-	ns	
			T_J=150℃	-	21.8	-	ns	
t_r	Rise Time		T_J=25℃	-	30.2	-	ns	
			T_J=150℃	-	32.1	-	ns	
$t_{d(off)}$	Turn-off Delay Time		T_J=25℃	-	139.7	-	ns	
			T_J=150℃	-	164.7	-	ns	
t_f	Fall Time		T_J=25℃	-	63.5	-	ns	
			T_J=150℃	-	97.3	-	ns	
E_{on}	Turn-on Switching Energy		T_J=25℃	-	0.74	-	mJ	
			T_J=150℃	-	0.84	-	mJ	
E_{off}	Turn-off Switching Energy		T_J=25℃	-	0.77	-	mJ	
			T_J=150℃	-	1.17	-	mJ	

Gate Charge Characteristics

Q_g	Gate Charge Total	V_{CC}=520V, I_C=50A V_{GE}=0 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

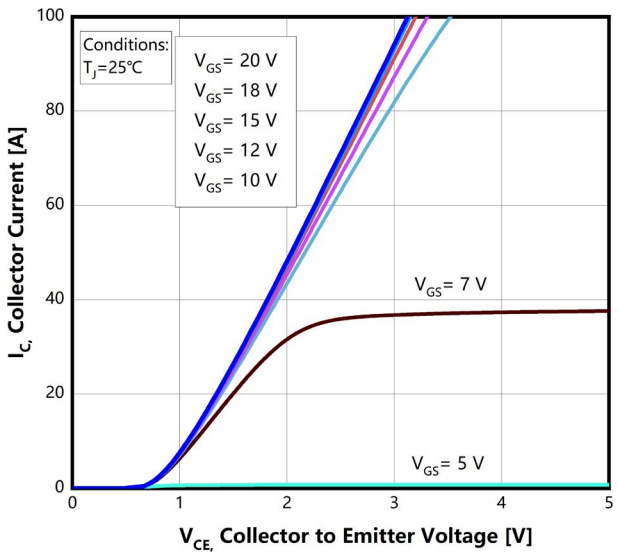


Fig.2 Typical Output characteristics

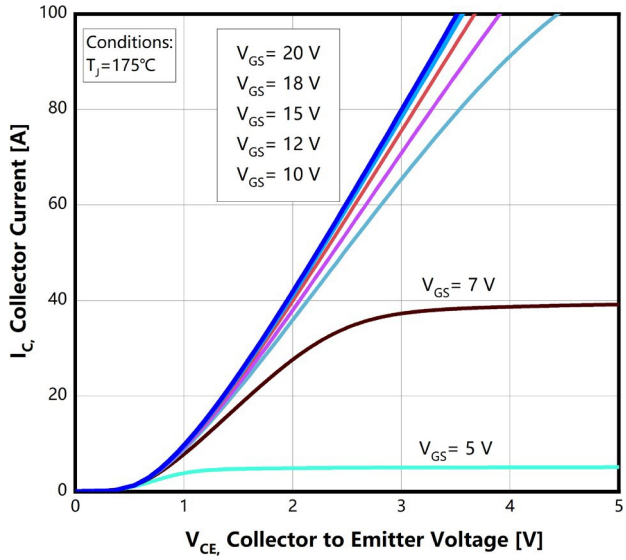


Fig3. Typical transfer characteristic

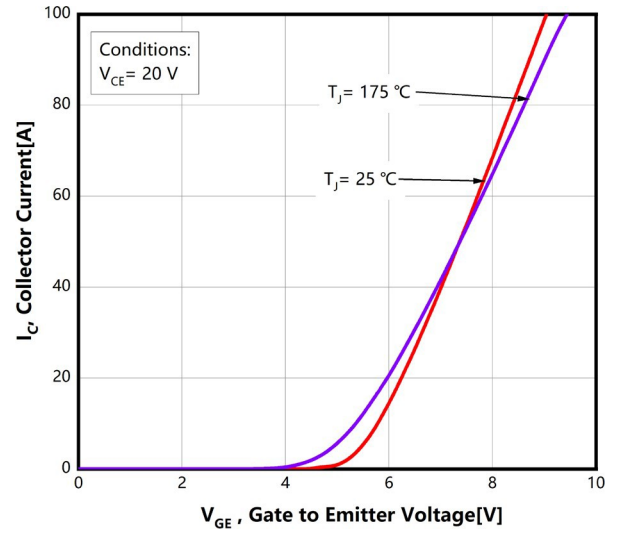
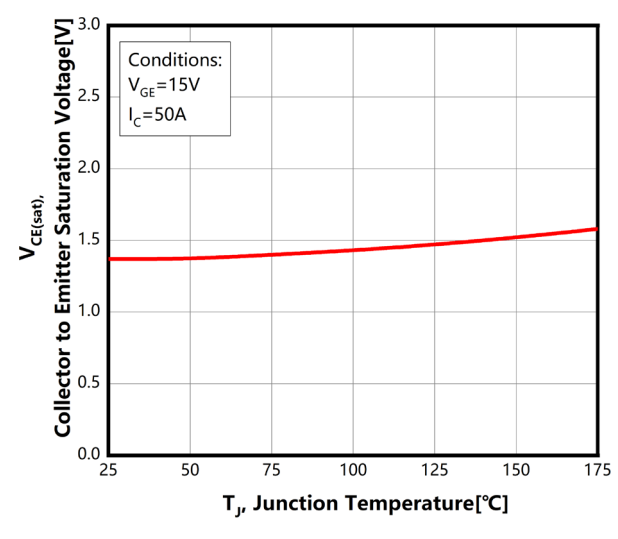


Fig4. Typical collector-emitter saturation voltage as a function of junction temperature



Typical Performance Characteristics

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

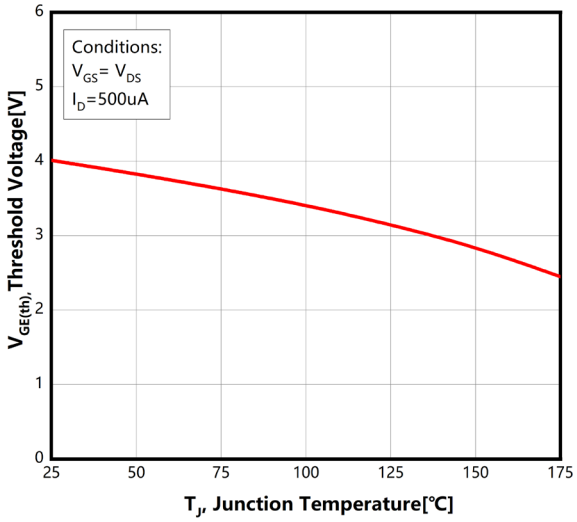


Figure 6. Typical capacitance as a function of collector-emitter voltage

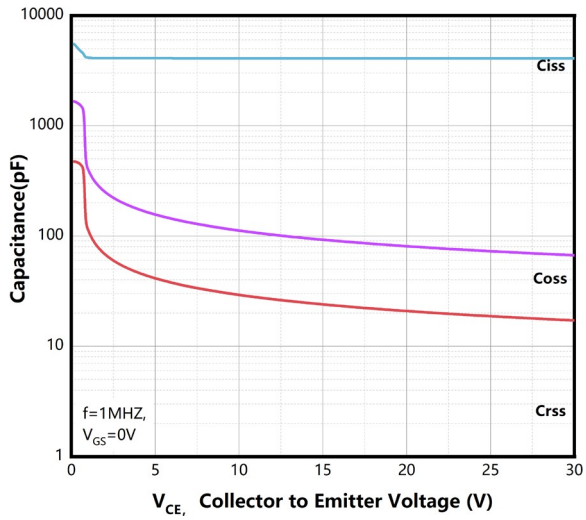


Figure 7. Typical gate charge

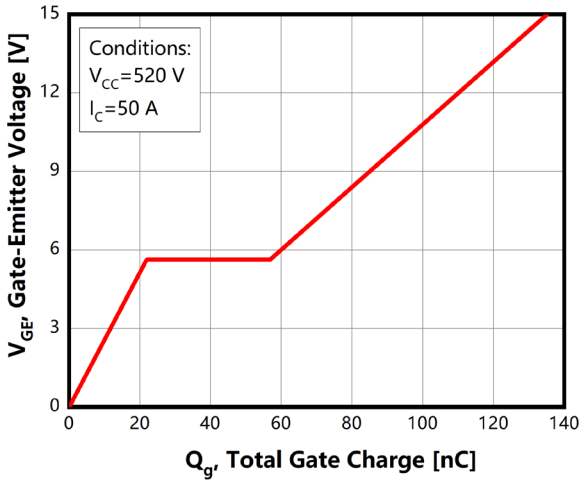
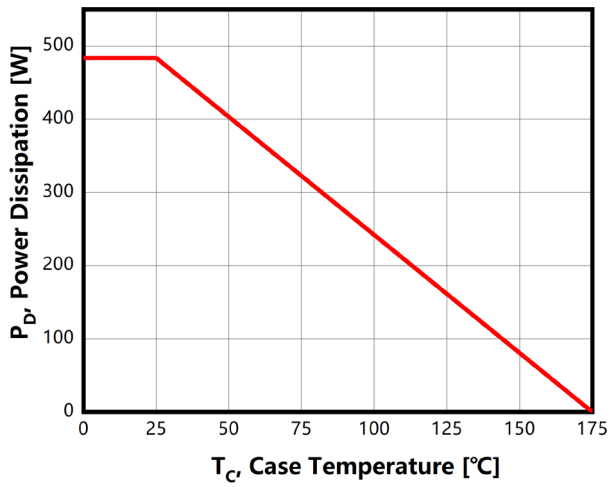


Figure 8. Power dissipation as a function of case temperature



Typical Performance Characteristics

Figure 9. Reverse bias safe operating area

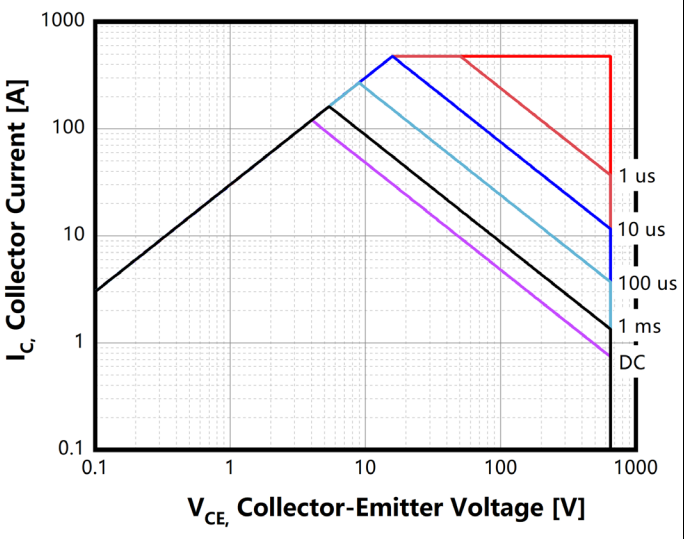


Figure 10. IGBT transient thermal impedance as a function of pulse width

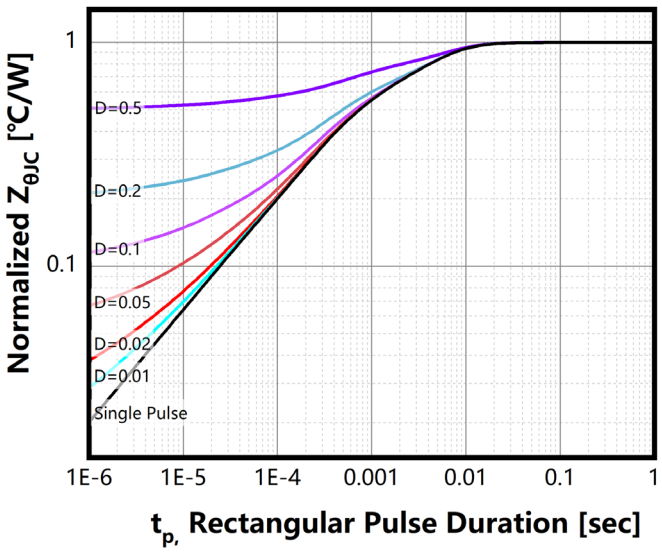


Figure 11. Typical Turn-on times as a function of collector current

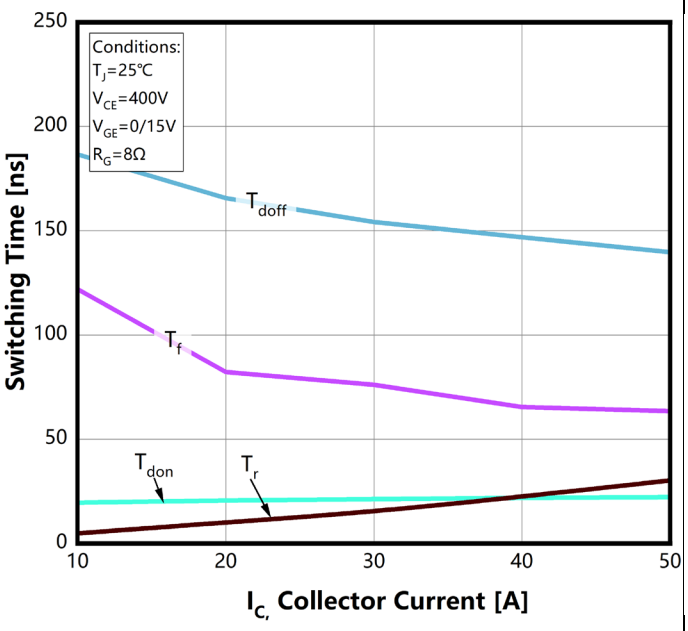
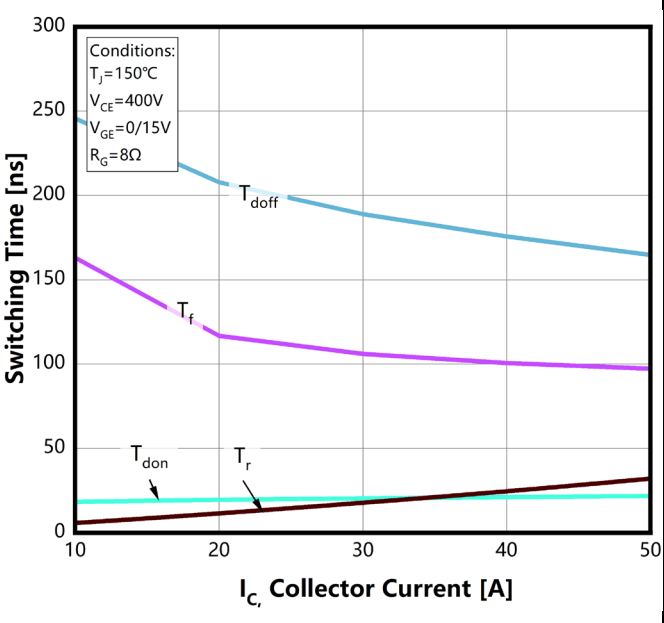


Figure 12. Typical Turn-on times as a function of collector current



Typical Performance Characteristics

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

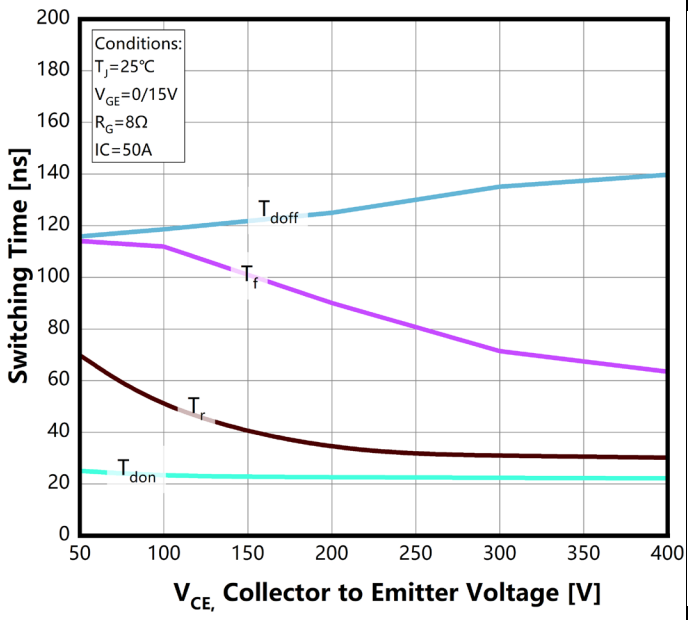


Figure 14. Typical switching times as a function of collector emitter voltage

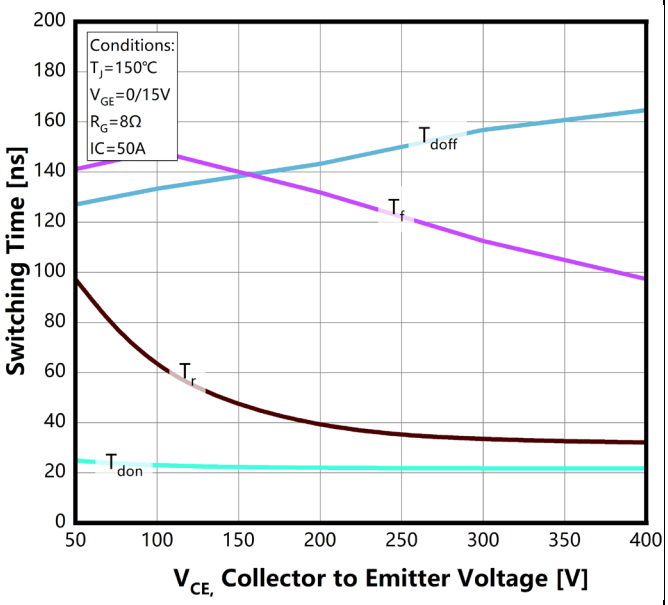


Figure 15. Typical switching times as a function of gate resistor

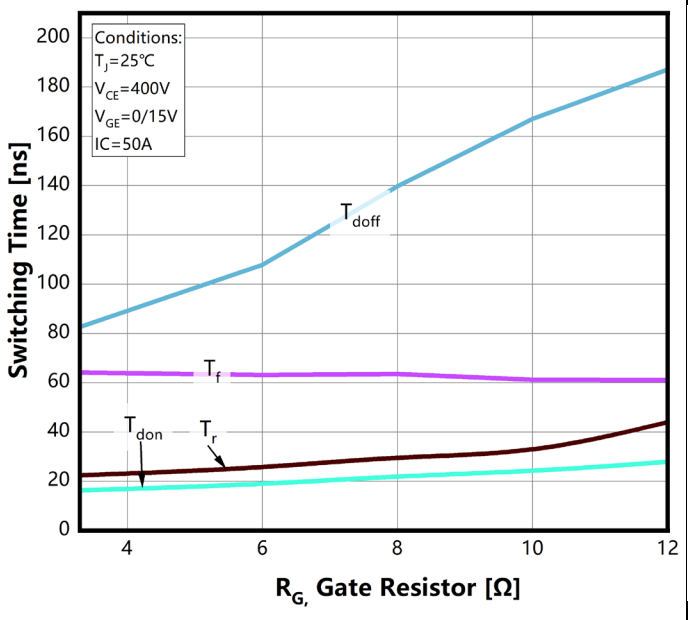
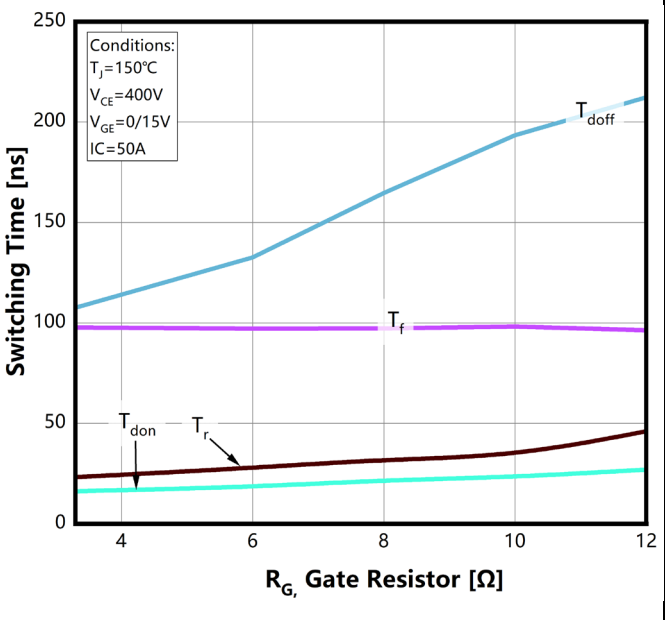


Figure 16. Typical switching times as a function of gate resistor



Typical Performance Characteristics

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

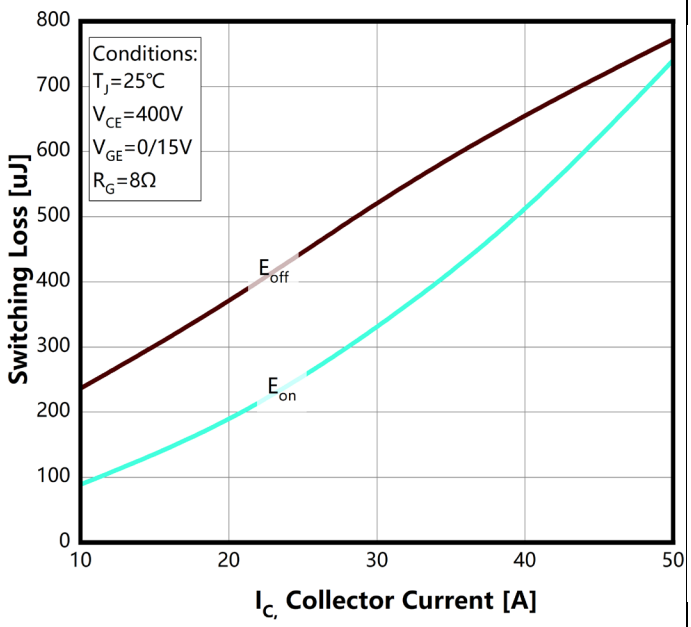


Figure 18. Typical switching energy losses as a function of collector current

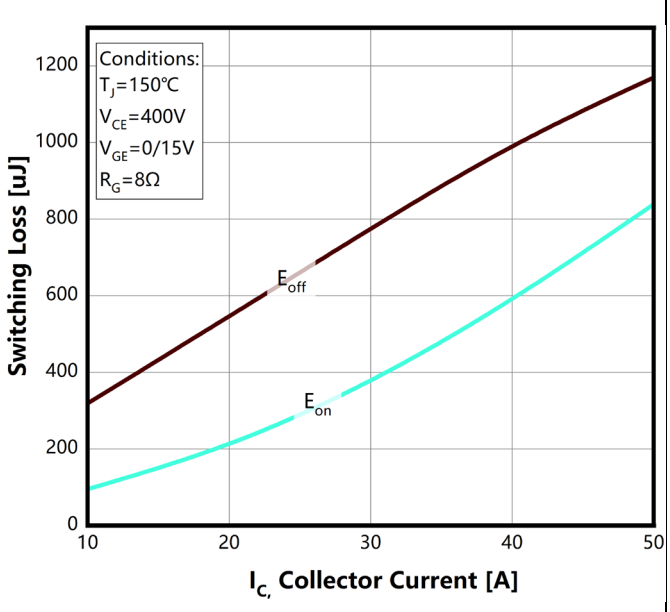


Figure 19. Typical switching energy losses as a function of collector emitter voltage

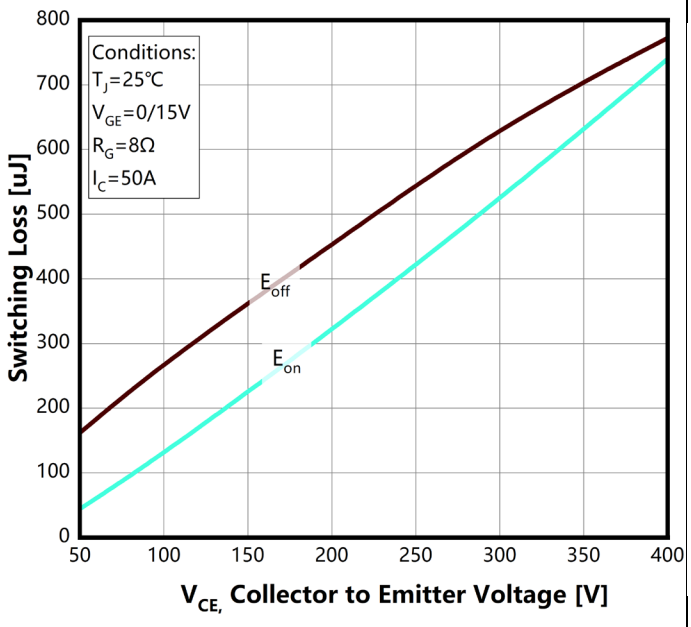
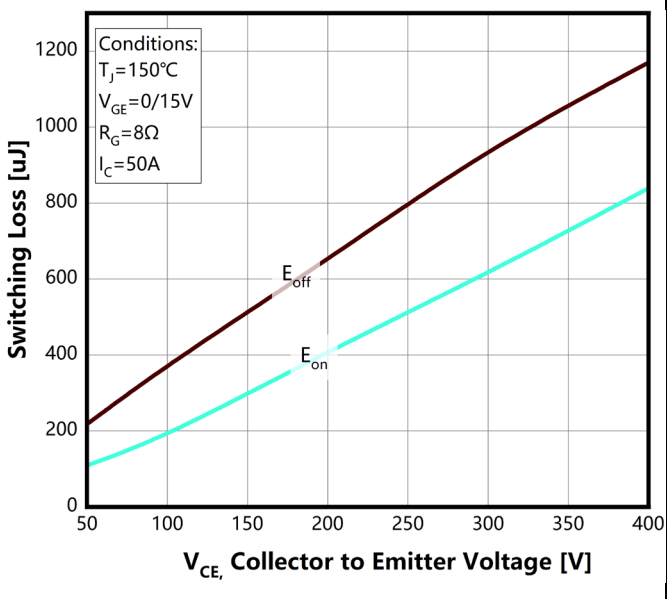


Figure 20. Typical switching energy losses as a function of collector emitter voltage



Typical Performance Characteristics

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

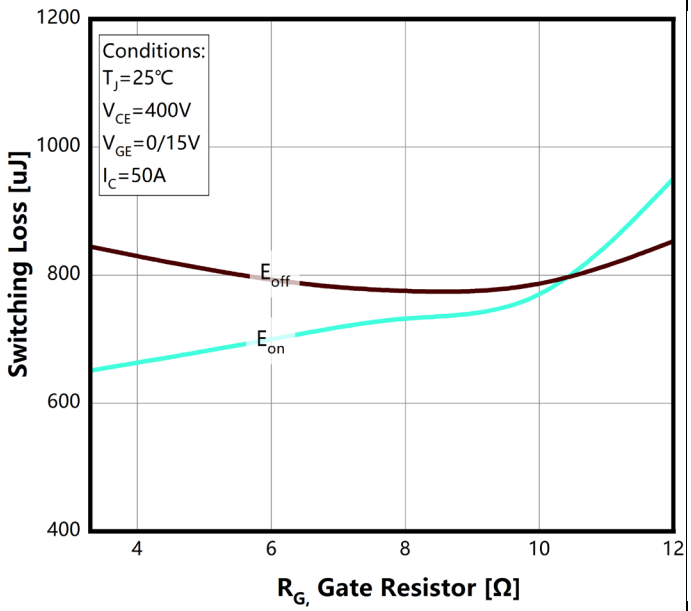


Figure 22. Typical switching energy losses as a function of gate resistor

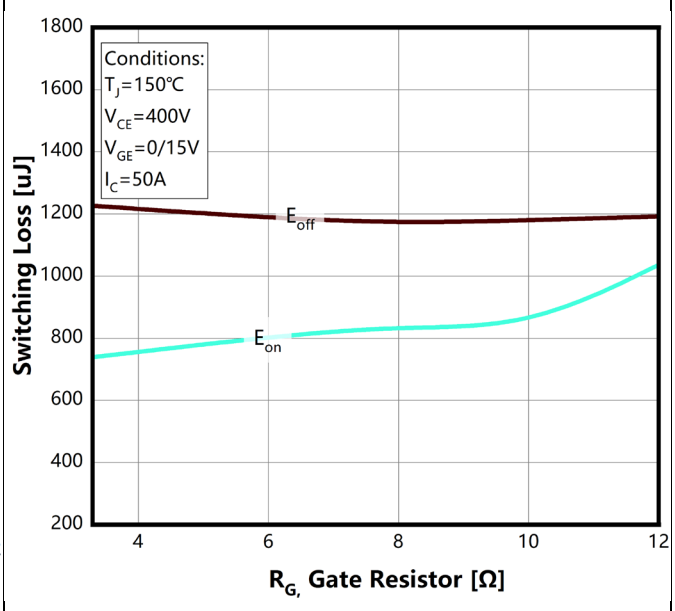


Figure 23. Typical switching times as a function of junction temperature

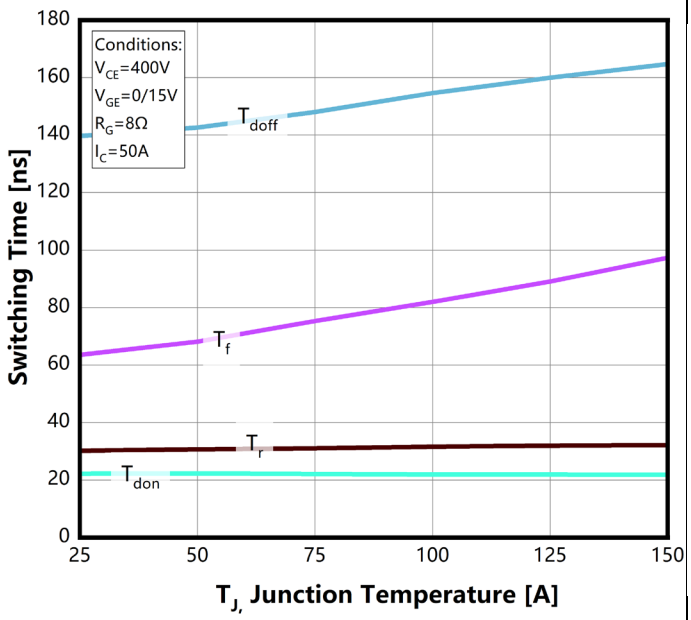
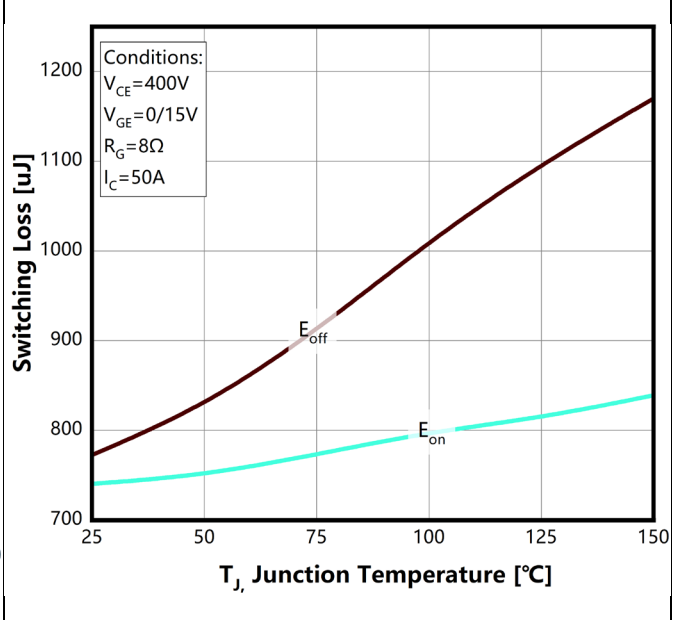


Figure 24. Typical switching energy losses as a function of junction temperature



Typical Performance Characteristics

Figure 25. Switching time test circuit and waveforms

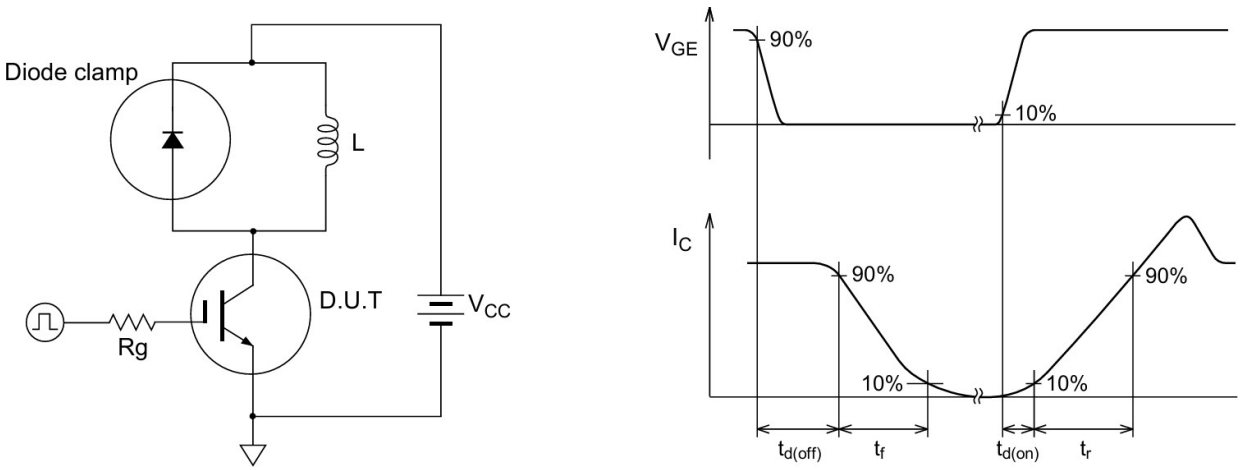
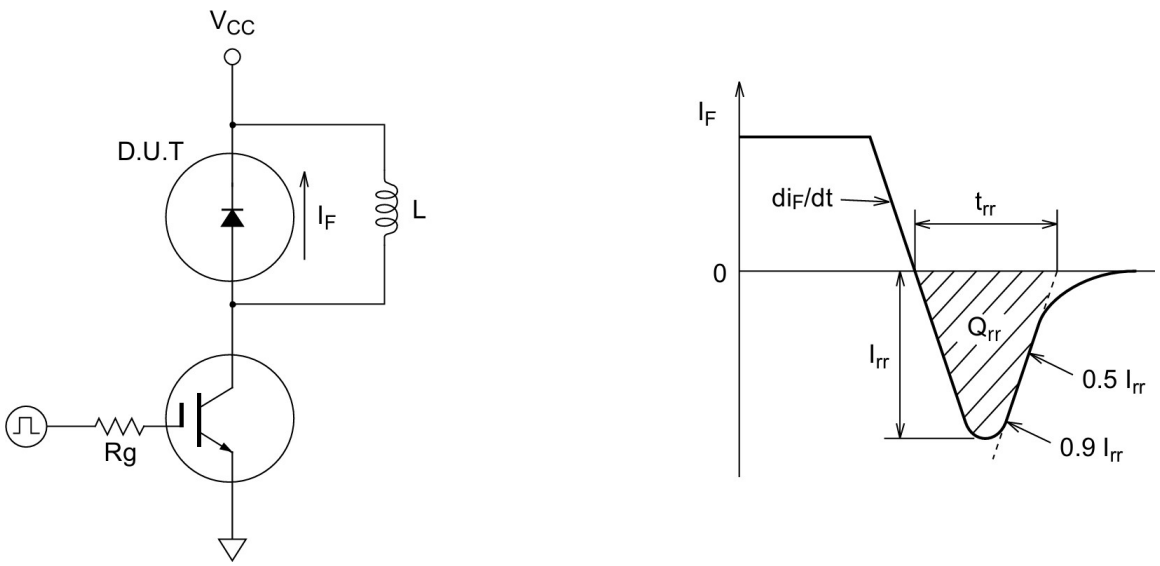
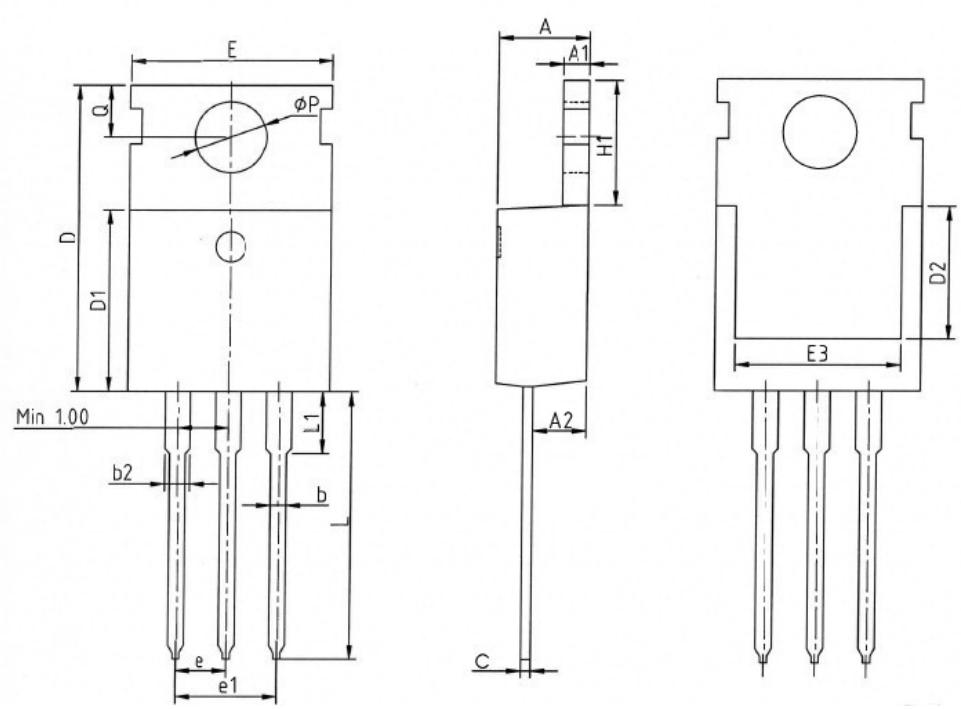


Figure 26. Reverse recovery time test circuit and waveforms



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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