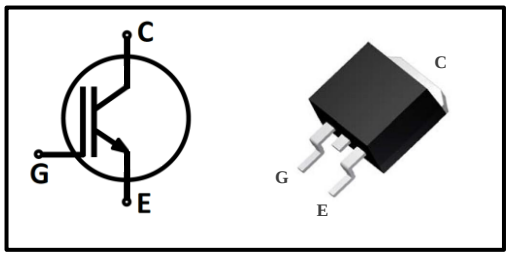
Features

- Easy parallel switching capability due to positive temperature coefficient in V_{CEsat}
- Low V_{CEsat}, fast switching
- High ruggedness, good thermal stability
- Very tight parameter distribution

Applications

- UPS
- PFC
- PTC Heater
- Climate Compressor

Type	Marking	Package Code
MPGC50N65E	MPG50N65E	TO-263



Maximum Rated Values [1]

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	650	V
DC collector current[2]			A
T_C=25℃	I_C	80	
T_C=100℃		50	
Pulsed collector current[3]	I_{Cpuls}	300	
Gate-emitter voltage	V_{GE}	±20	V
Transient Gate-emitter voltage（t_p≤10us)		±30	
Power dissipation			W
T_C=25℃	P_{tot}	300	
T_C=100℃		150	
Operating junction temperature	T_j	-55~175	℃
Storage temperature	T_{stg}	-55~150	

1:Reference standard: JESD-022 2: limited by Tjmax 3: Tp limited by Tjmax ;

Thermal Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
IGBT thermal resistance, junction-case	R_{thJC}	-	-	TBD	K/W
Thermal Resistance, junction-ambient	R_{thJA}	-	-	TBD	

Electrical Characteristics（at Tj=25℃, unless otherwise specified）

Static Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE}=0V, I_C=0.25mA	650	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=50A T_j=25℃	-	1.60	1.90	
		T_j=125℃	-	1.90	-	
		T_j=150℃	-	1.98	-	
G-E threshold voltage	$V_{GE(th)}$	I_C=1mA, V_{CE}=V_{GE}	4.5	5.5	6.5	
C-E leakage current	I_{CES}	V_{CE}=650V, V_{GE}=0V T_j=25℃	-	-	0.01	mA
		T_j=150℃	-	-	1.0	
G-E leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V	-	-	250	nA
Transconductance	g_{FS}	V_{CE}=20V, I_C=50A	-	21	-	S

Dynamic Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input capacitance	C_{iss}	V_{CE}=25V, V_{GE}=0V, f=1MHz	-	5573	-	pF
Output capacitance	C_{oss}		-	175	-	
Reverse transfer capacitance	C_{rss}		-	80	-	
Gate charge	Q_G	V_{CC}=300V, I_C=50A, V_{GE}=15V	-	230	-	nC

IGBT Switching Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	T_j=25℃, V_{CC}=400V, I_C=50A, V_{GE}=0/15V, R_G=10Ω, Diode from MPBW50N65E Inductive load	-	89	-	ns
Rise time	t_r		-	62	-	
Turn-off delay time	$t_{d(off)}$		-	265	-	
Fall time	t_f		-	47	-	
Turn-on energy	E_{on}		-	1.22	-	mJ
Turn-off energy	E_{off}		-	1.20	-	
Total switching energy	E_{ts}		-	2.42	-	
Turn-on delay time	$t_{d(on)}$	T_j=150℃, V_{CC}=400V, I_C=50A, V_{GE}=0/15V, R_G=10Ω, Diode from MPBW50N65E Inductive load	-	91	-	ns
Rise time	t_r		-	63	-	
Turn-off delay time	$t_{d(off)}$		-	302	-	
Fall time	t_f		-	55	-	
Turn-on energy	E_{on}		-	2.24	-	mJ
Turn-off energy	E_{off}		-	1.50	-	
Total switching energy	E_{ts}		-	3.74	-	

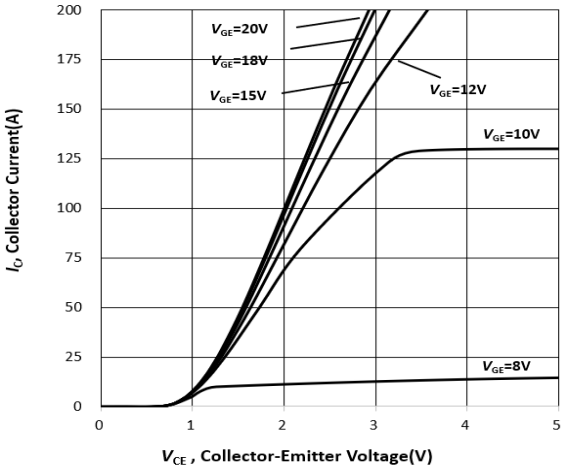


Figure 1. Typical output characteristic (T_j =25 ℃)

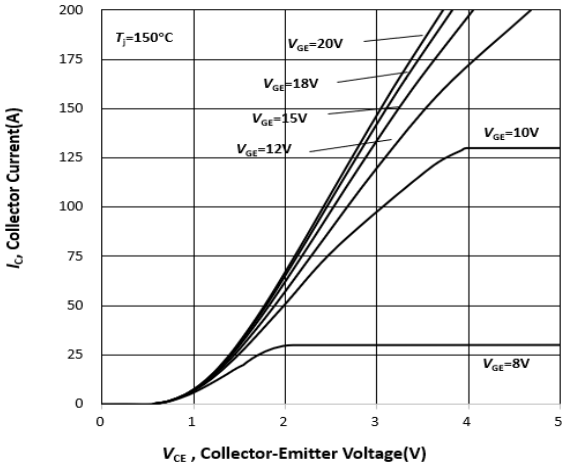


Figure 2. Typical output characteristic (T_j =150 ℃)

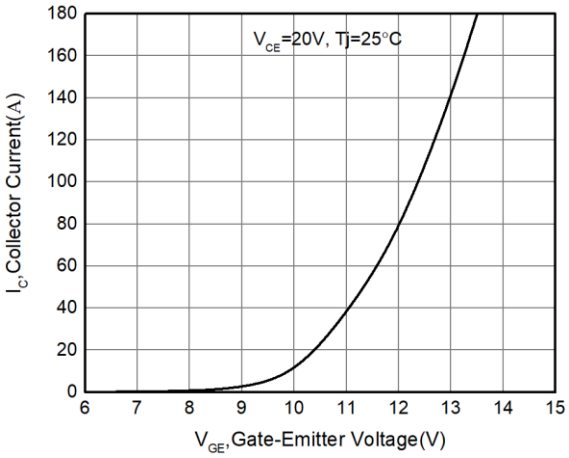


Figure 3. Typical transfer characteristic (T_j =25 ℃)

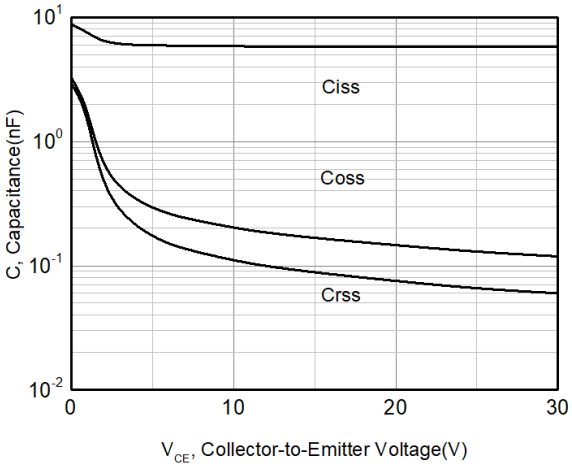


Figure 4. Capacitance characteristic (V_{GE}=0V, f=1MHz)

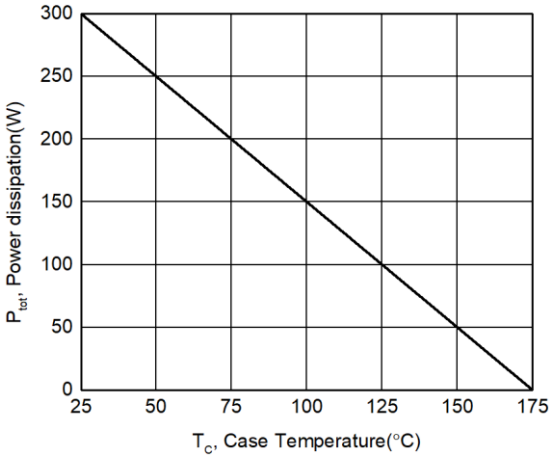


Figure 5. Power dissipation as a function of case temperature (T_j≤175 ℃)

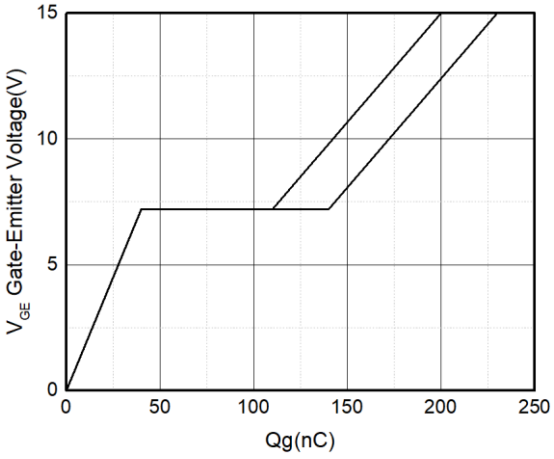


Figure 6. Typical gate charge (I_C=50A)

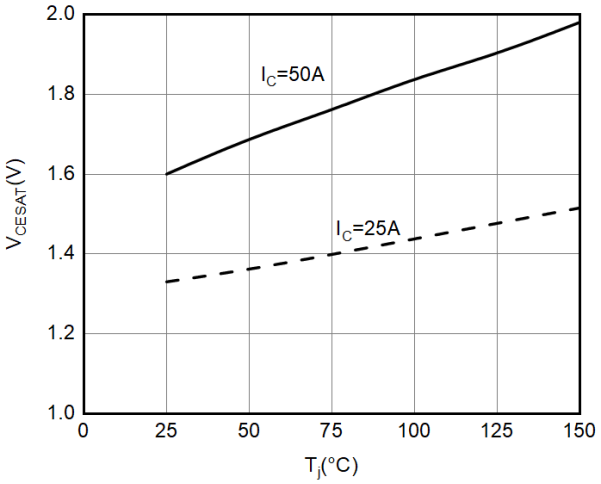


Figure 7. V_{CESAT} as a function of junction temperature (V_{GE}=15V)

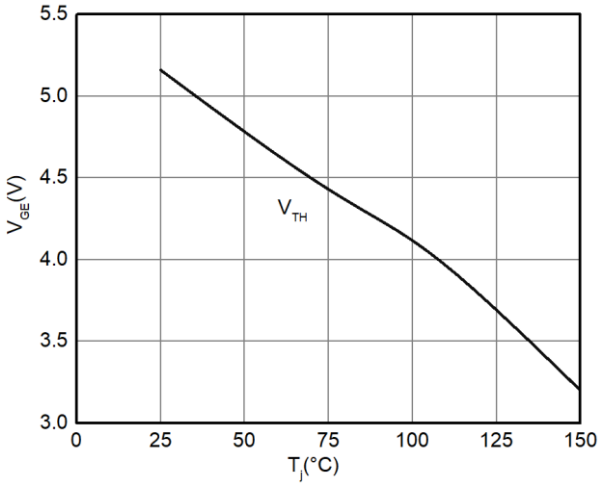


Figure 8. V_{TH} as a function of junction temperature (I_{CE}=250μA)

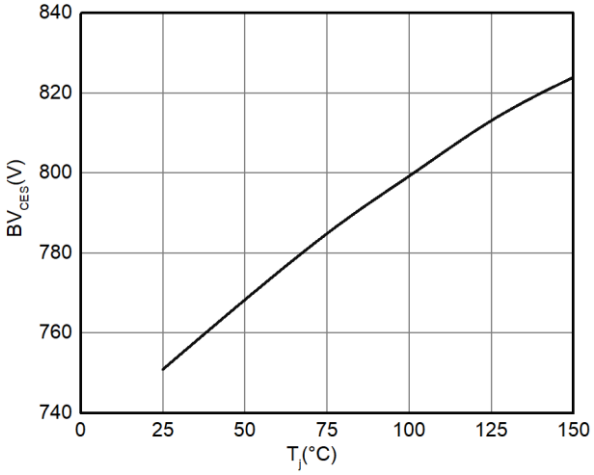


Figure 9. BV as a function of junction temperature (I_{CE}=250μA)

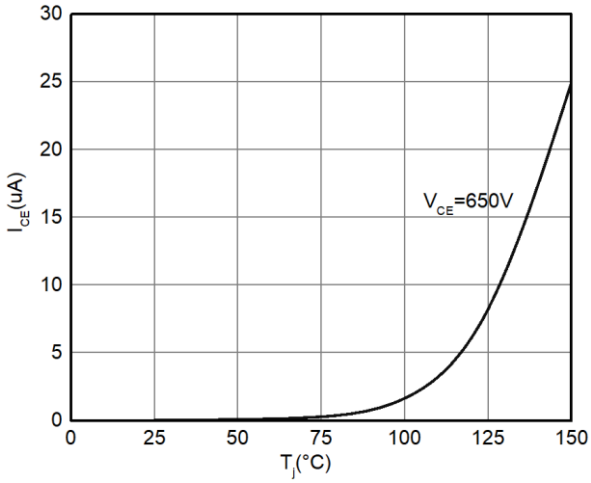


Figure 10. I_{CES} leakage current as a function of junction temperature

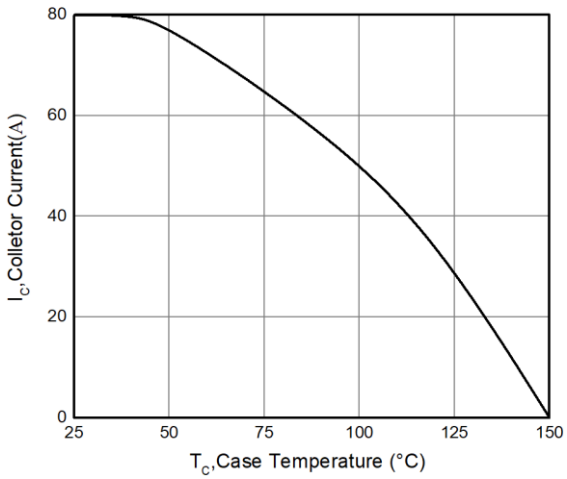


Figure 11. Collector current as a function of case temperature (V_{GE}≥15V, T_j≤150 ℃)

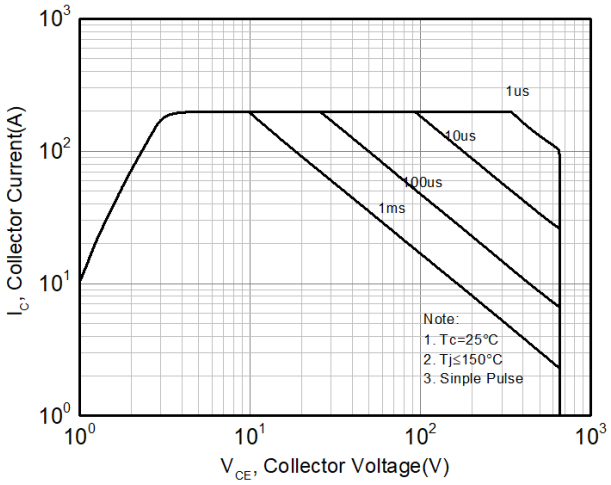


Figure 12. FBSOA

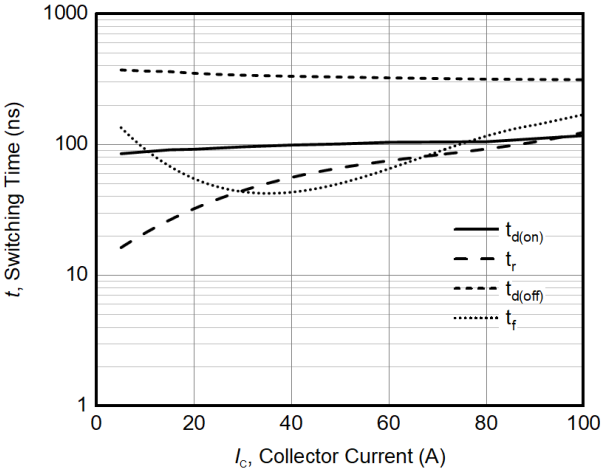


Figure 13. Typical switching times as a function of collector current
(T_j=150 ℃, V_{CE}=400V, $R_{G(on)}$=$R_{G(off)}$=10Ω)

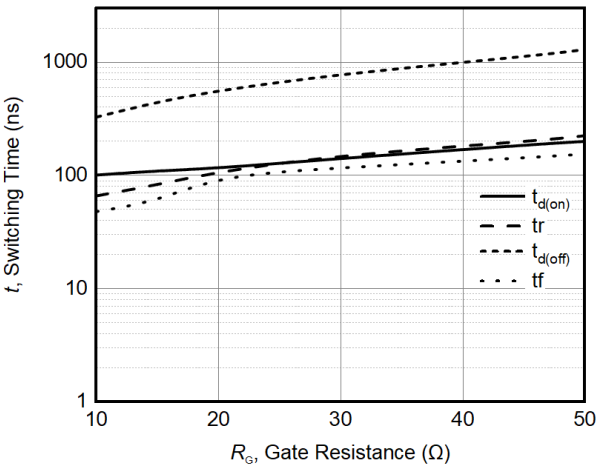


Figure 14. Typical switching times as a function of gate resistance
(T_j=150 ℃, V_{CE}=400V, I_C=50A)

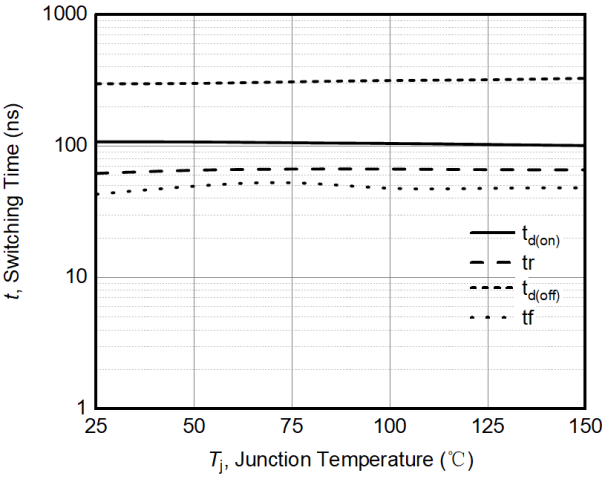


Figure 15. Typical switching times as a function of junction temperature
(V_{CE}=400V, I_C=50A, $R_{G(on)}$=$R_{G(off)}$=10Ω)

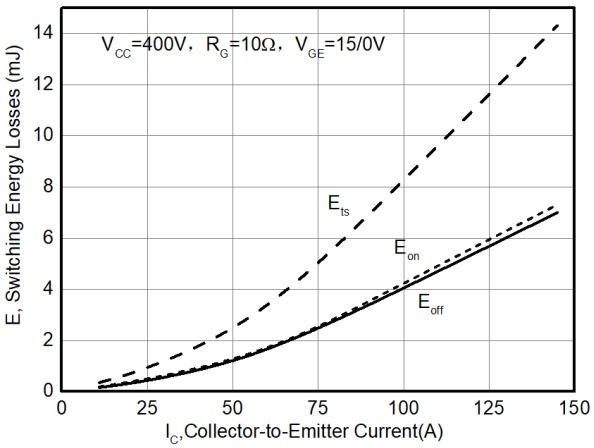


Figure 16. E_{on}, E_{off} as a function of I_C
(T_j=25 ℃)

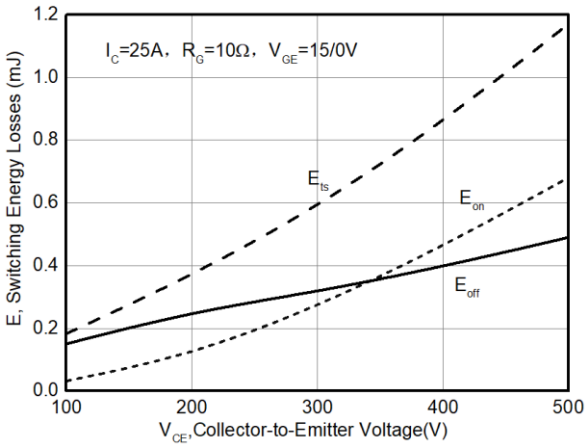


Figure 17. E_{on}, E_{off} as a function of V_{CE}
(T_j=25 ℃)

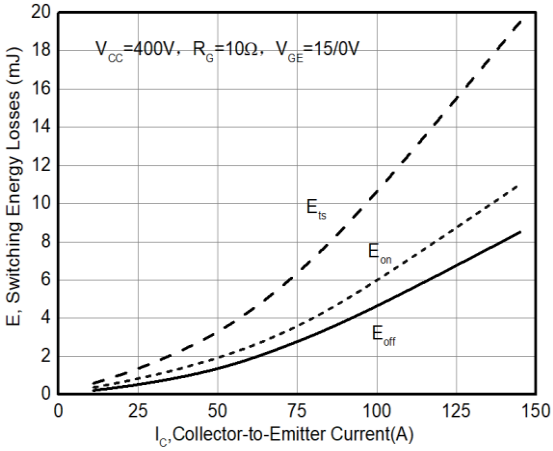


Figure 18. E_{on}, E_{off} as a function of I_C
(T_j=150 ℃)

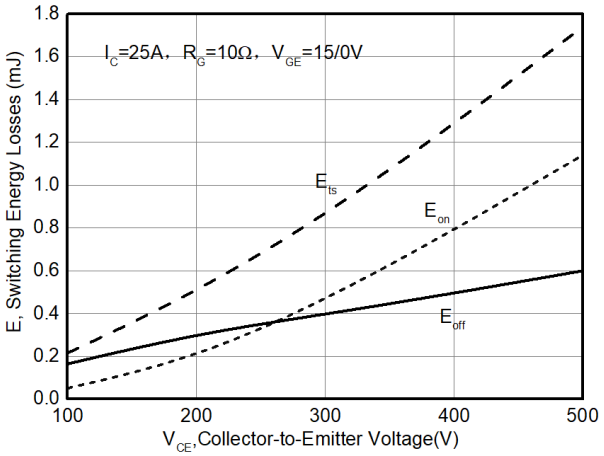


Figure 19. E_{on}, E_{off} as a function of V_{CE} (T_j=150 ℃)

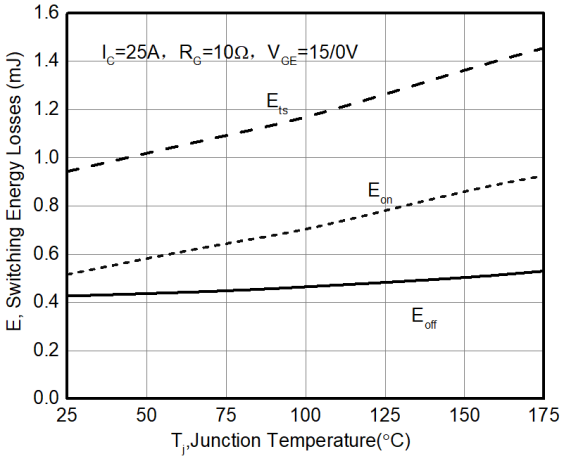


Figure 20. E_{on}, E_{off} as a function of junction temperature

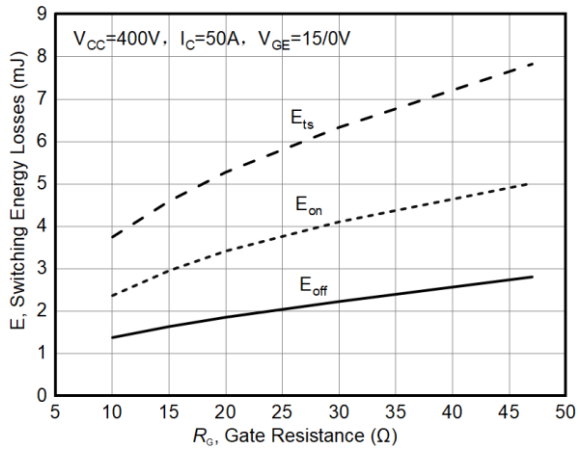


Figure 21. E_{on}, E_{off} as a function of gate resistance (T_j=150 ℃)

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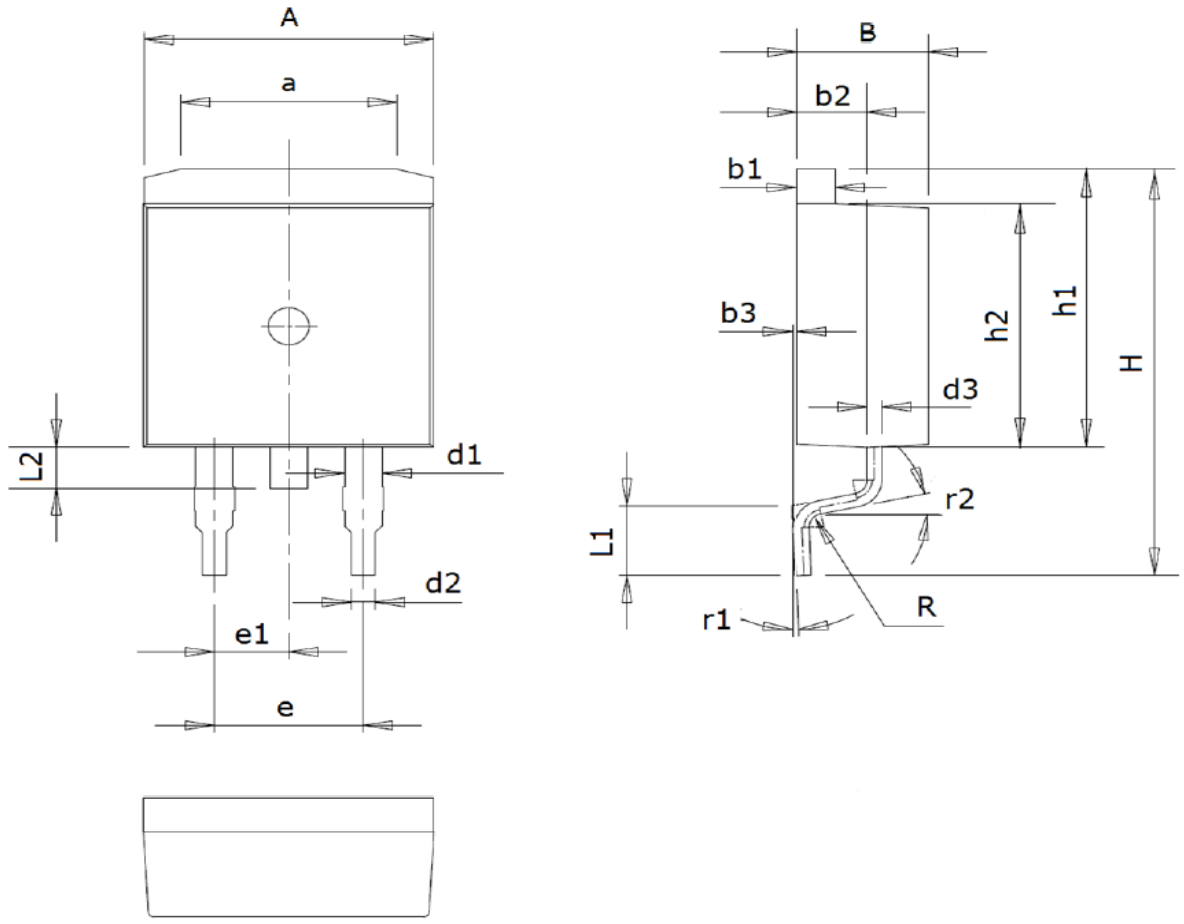

Symbol	Dimensions (mm)	Symbol	Dimensions (mm)	Symbol	Dimensions (mm)
A	9.86~10.26	d2	0.7~0.96	L1	2.0~2.6
a	7.0~7.8	d3	0.3~0.53	L2	1.3~1.8
B	4.37~4.77	e	5.08	R	0.5
b1	1.22~1.42	e1	2.54	r1	0-9°
b2	2.2~2.6	H	14.7~15.5	r2	12°
b3	0~0.25	h1	10.3~10.7		
d1	1.17~1.47	h2	9.1~9.4		

Revision History：

Revision	Date	Subjects (major changes since last revision)
1.0	2023-02-16	Initial Version

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