QMW50N65E

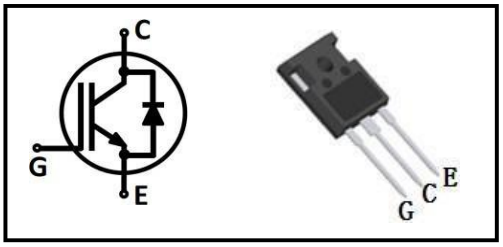
650V-50A Trench and Field Stop IGBT

特征/Features

- 饱和压降为正温度系数，易于并联使用
  Easy parallel switching capability due to positive temperature coefficient in V_{CEsat}
- 低饱和压降，快速开关
  Low V_{CEsat}，fast switching
- 高可靠性及热稳定性，良好的参数一致性
  High ruggedness, good thermal stability very tight parameter distribution

应用领域/Applications

- 空气压缩机/Climate Compressor
- 不间断电源/UPS
- 功率因数校正/PFC
- PTC加热器/PTC Heater



型号/Type	打标/Marking	封装/Package
QMW50N65E	QM50N65E	TO-247

最大额定值/Maximum Rated Values [1]

Item	Symbol	Value	Unit
集电极-发射极电压 Collector-emitter voltage	V_{CE}	650	V
集电极电流 DC collector current[2]			A
T_C=25℃	I_C	80	
T_C=100℃		50	
集电极脉冲电流 Pulsed collector current[3]	I_{Cpuls}	200	
二极管正向电流 Diode forward current[2]			
T_C=25℃	I_F	80	
T_C=100℃		50	
二极管脉冲电流 Diode pulsed current[3]	I_{Fpuls}	200	
栅极-发射极电压 Gate-emitter voltage	V_{GE}	±20	V
瞬态栅极-发射极电压 Transient Gate-emitter voltage（t_p≤10us)		±30	
耗散功率 Power dissipation			W
T_C=25℃	P_{tot}	300	
T_C=100℃		150	
工作结温 Operating junction temperature	T_j	-55~175	℃
储存温度 Storage temperature	T_{stg}	-55~150	

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

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电学特性/Electrical Characteristics

静态特性/Static Characteristics (at Tj=25℃ unless otherwise specified)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
集电极－发射极击穿电压 Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE}=0V, I_C=0.25mA	650	-	-	V
集电极－发射极饱和电压 Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=50A T_j=25℃	-	1.60	1.90	
		T_j=125℃	-	1.72	-	
		T_j=150℃	-	1.80	-	
二极管正向压降 Diode forward voltage	V_F	V_{GE}=0V,I_F=50A T_j=25℃	-	1.65	1.95	
		T_j=125℃	-	1.57	-	
		T_j=150℃	-	1.53	-	
阈值电压 G-E threshold voltage	$V_{GE(th)}$	I_C=1mA, V_{CE}=V_{GE}	4.5	5.5	6.5	
集电极-发射极漏电流 C-E leakage current	I_{CES}	V_{CE}=650V,V_{GE}=0V T_j=25℃	-	-	0.01	mA
		T_j=150℃	-	-	1.0	
栅极-发射极漏电流 G-E leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V	-	-	250	nA
跨导 Transconductance	g_{FS}	V_{CE}=20V, I_C=50A	-	21	-	S

动态特性/Dynamic Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
输入电容 Input capacitance	C_{iss}	V_{CE}=25V, V_{GE}=0V, f=1MHz	-	5810	-	pF
输出电容 Output capacitance	C_{oss}		-	130	-	
反馈电容 Reverse transfer capacitance	C_{rss}		-	65	-	
栅电荷 Gate charge	Q_G	V_{CC}=300V, I_C=50A, V_{GE}=15V	-	230	-	nC

热学特性/Thermal Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
结－外壳热阻 IGBT thermal resistance, junction-case	R_{thJC}	-	-	-	0.5	K/W
二极管结－外壳热阻 Diode thermal resistance, junction-case	R_{thJCD}	-	-	-	0.65	
结-环境热阻 Thermal Resistance, junction-ambient	R_{thJA}	-	-	-	40	

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二极管开关特性/Diode Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
反向恢复时间 Diode reverse recovery time	t_{rr}	T_j=25 ℃, V_R=400V, I_F=50A, di_F/dt=600A/μs	-	105	-	ns
反向恢复电荷 Diode reverse recovery charge	Q_{rr}		-	0.96	-	μC
反向恢复峰值电流 Diode peak reverse recovery current	I_{rrm}		-	14.8	-	A
反向恢复时间 Diode reverse recovery time	t_{rr}	T_j=150 ℃, V_R=400V, I_F=50A, di_F/dt=600A/μs	-	150	-	ns
反向恢复电荷 Diode reverse recovery charge	Q_{rr}		-	3.05	-	uC
反向恢复峰值电流 Diode peak reverse recovery current	I_{rrm}		-	33	-	A

IGBT开关特性(感性负载)/IGBT Switching Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
开通延迟时间 Turn-on delay time	$t_{d(on)}$	T_j=25℃, V_{CC}=400V, I_C=50A, V_{GE}=0/15V, R_G=10Ω, Inductive load	-	89	-	ns
上升时间 Rise time	t_r		-	62	-	
关断延迟时间 Turn-off delay time	$t_{d(off)}$		-	265	-	
下降时间 Fall time	t_f		-	47	-	
开通损耗 Turn-on energy	E_{on}		-	1.20	-	mJ
关断损耗 Turn-off energy	E_{off}		-	1.12	-	
开关损耗 Total switching energy	E_{ts}		-	2.32	-	
开通延迟时间 Turn-on delay time	$t_{d(on)}$	T_j=150℃, V_{CC}=400V, I_C=50A, V_{GE}=0/15V, R_G=10Ω, Inductive load	-	91	-	ns
上升时间 Rise time	t_r		-	63	-	
关断延迟时间 Turn-off delay time	$t_{d(off)}$		-	302	-	
下降时间 Fall time	t_f		-	55	-	
开通损耗 Turn-on energy	E_{on}		-	1.91	-	mJ
关断损耗 Turn-off energy	E_{off}		-	1.33	-	
开关损耗 Total switching energy	E_{ts}		-	3.24	-	

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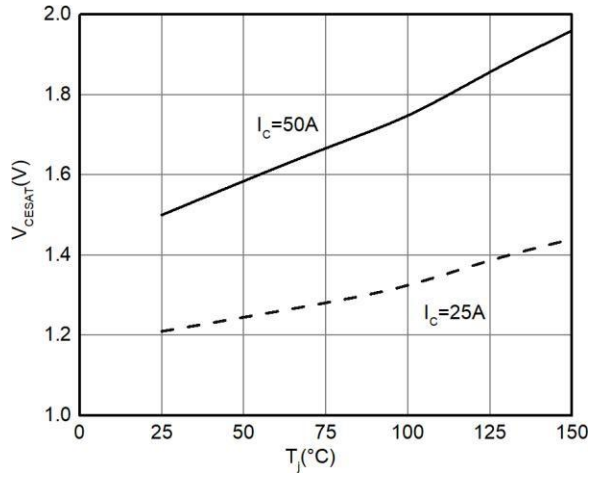

Figure 1.V_{CESAT}作为结温的函数曲线/
V_{CESAT} as a function of junction temperature (V_{GE}=15V)

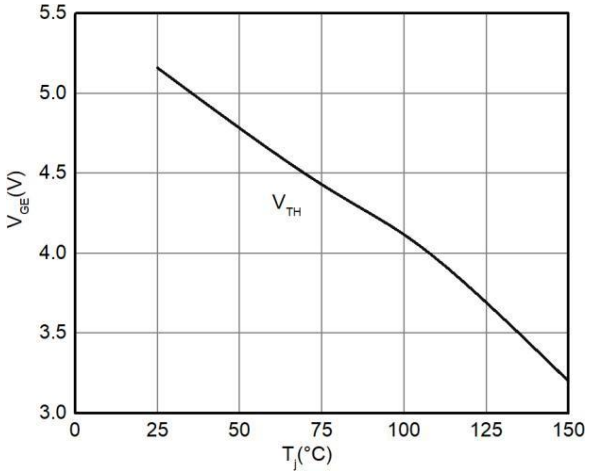

Figure 2. V_{TH}与结温的关系曲线/
V_{TH} as a function of junction temperature (I_{CE}=250uA)

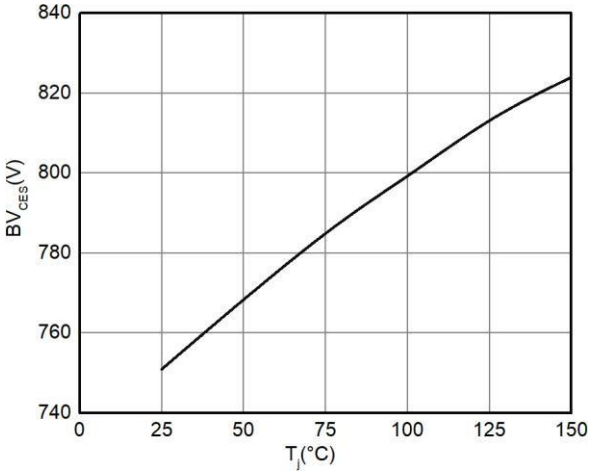

Figure 3. BV作为结温的函数曲线/
BV as a function of junction temperature (I_{CE}=250uA)

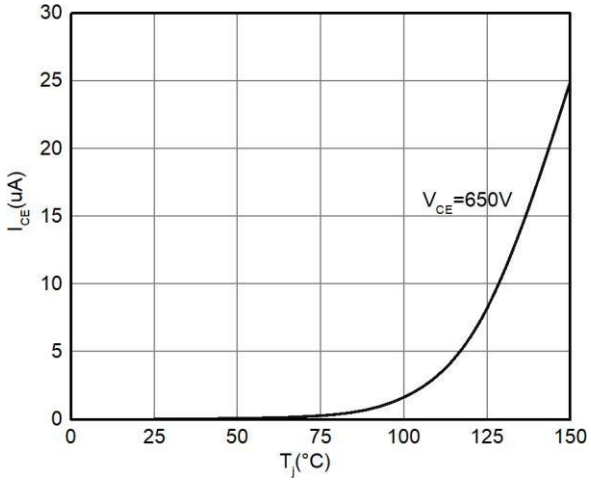

Figure 4. I_{CES}漏电流与结温的关系曲线/
I_{CES} leakage current as a function of junction temperature

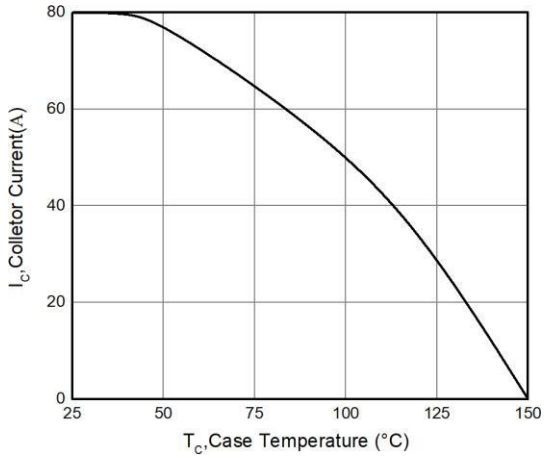

Figure 5.集电极电流与外壳温度的关系/
Collector current as a function of case temperature(V_{GE}≥15V, T_j≤150℃)

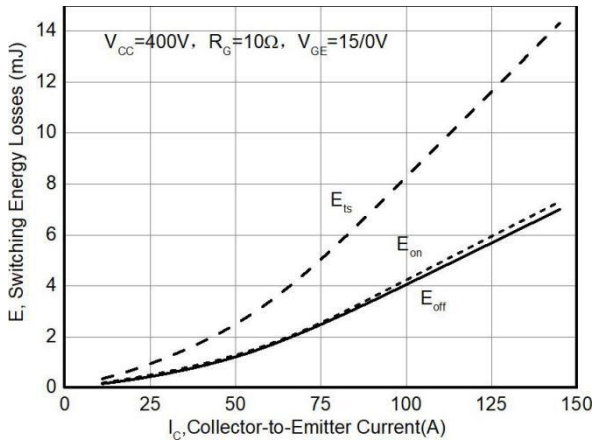

Figure 6 .E_{on}， E_{off} 作为 I_C 的函数曲线/
E_{on}, E_{off} as a function of I_C (T_j=25℃)

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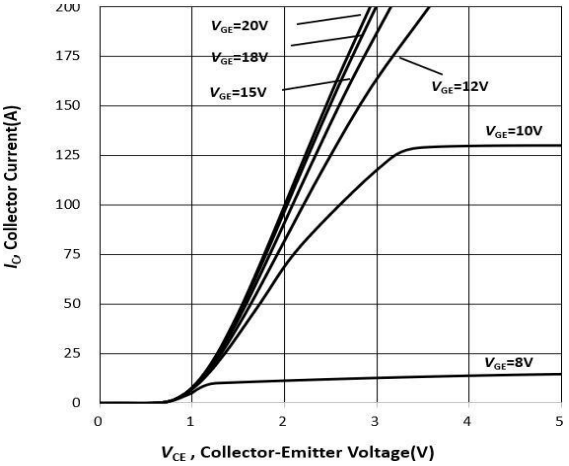

Figure 7. 典型输出特性/
Typical output characteristic (T_j =25℃)

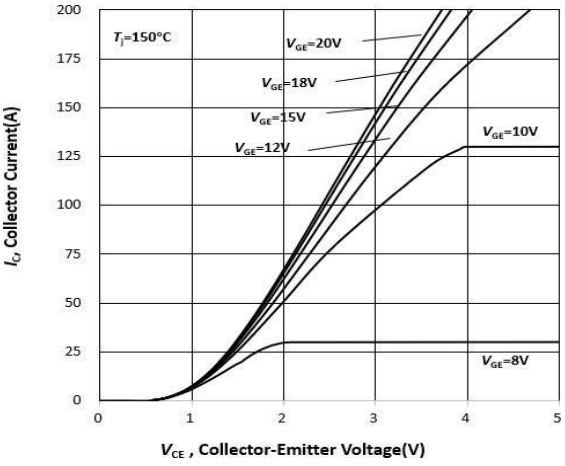

Figure 8. 典型输出特性/
Typical output characteristic (T_j =150℃)

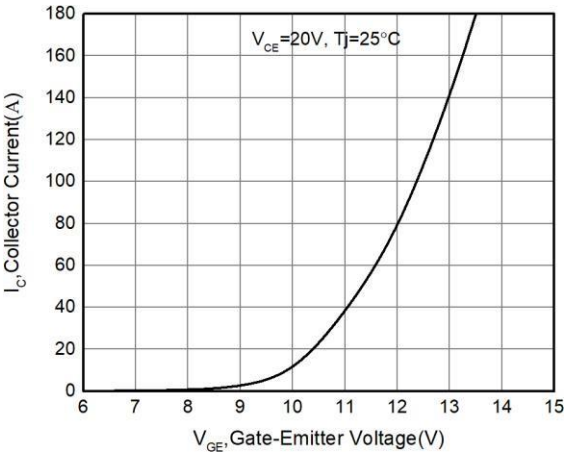

Figure 9.典型传输特性/
Typical transfer characteristic (T_j =25℃)

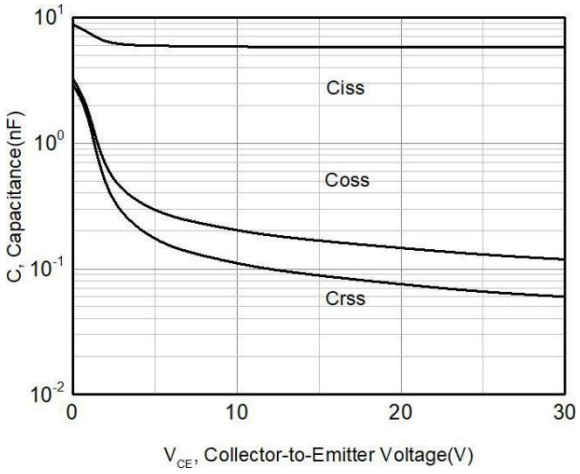

Figure 10. 电容特性/
Capacitance characteristic
(V_{GE}=0V, f=1MHz)

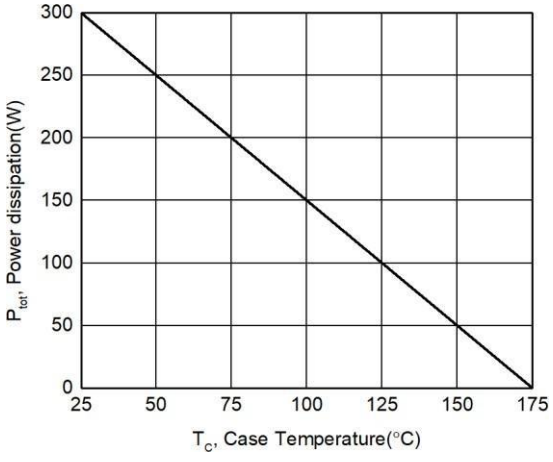

Figure 11. 功耗与外壳温度的关系曲线/Power dissipation as a function of case temperature (T_J≤175℃)

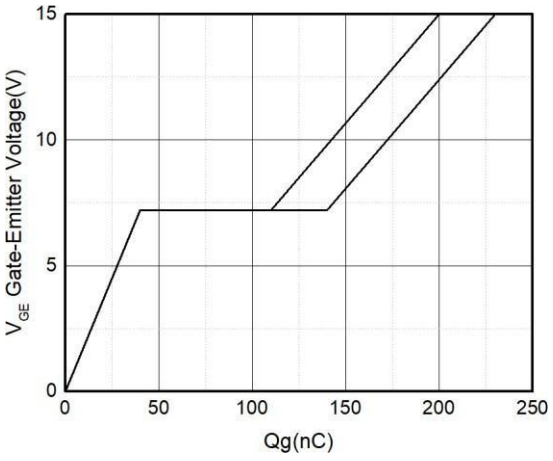

Figure 12. 典型栅极电荷/
Typical gate charge (I_C=50A)

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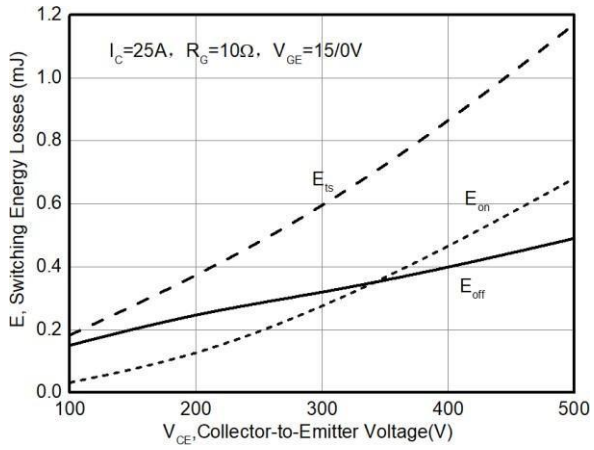

Figure 13. E_{on}, E_{off} 作为 V_{CE} 的函数曲线 /E_{on}, E_{off} as a function of VCE(T_j=25℃)

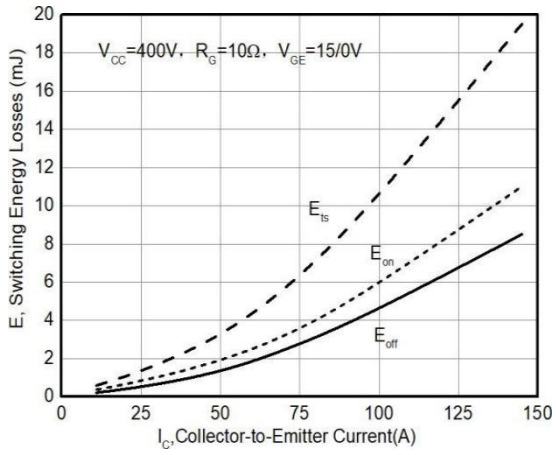

Figure 14. E_{on},E_{off} 作为 I_C 的函数曲线 /E_{on}, E_{off} as a function of I_C (T_j=150℃)

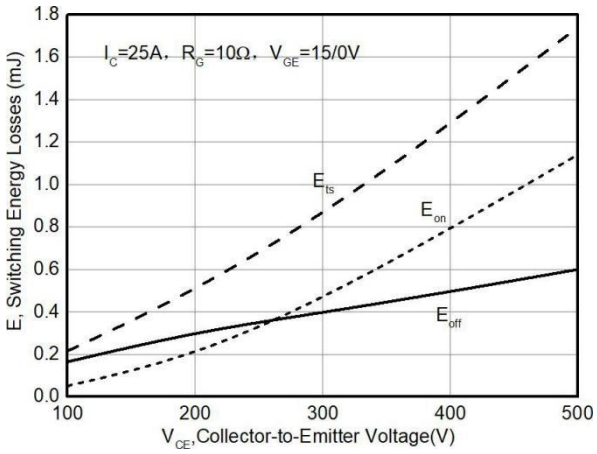

Figure 15. E_{on}, E_{off} 作为 V_{CE} 的函数曲线/ E_{on}, E_{off} as a function of VCE(T_j=150℃)

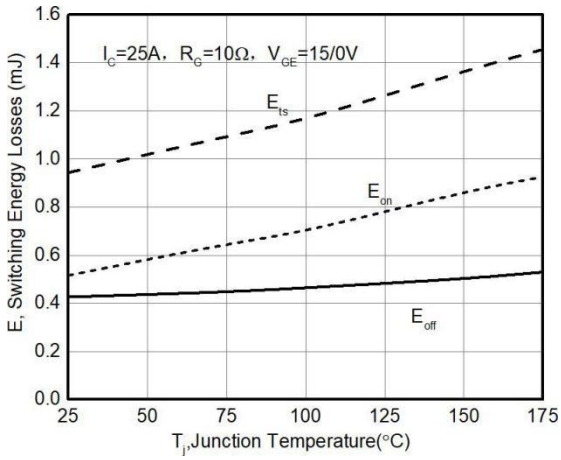

Figure 16. E_{on}，E_{off}作为结温的函数/E_{on}, E_{off} as a function of junction temperature

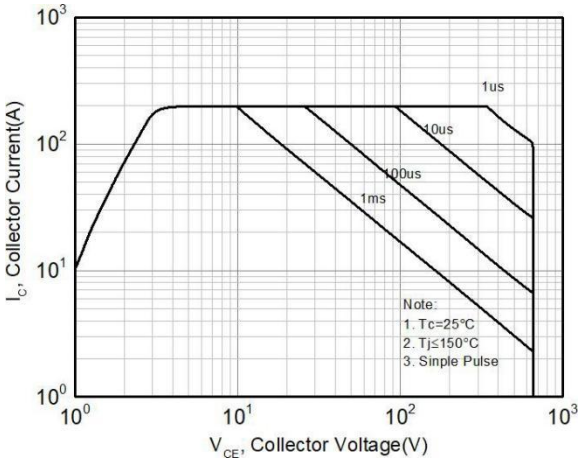

Figure 17. 正偏安全工作区/FBSOA

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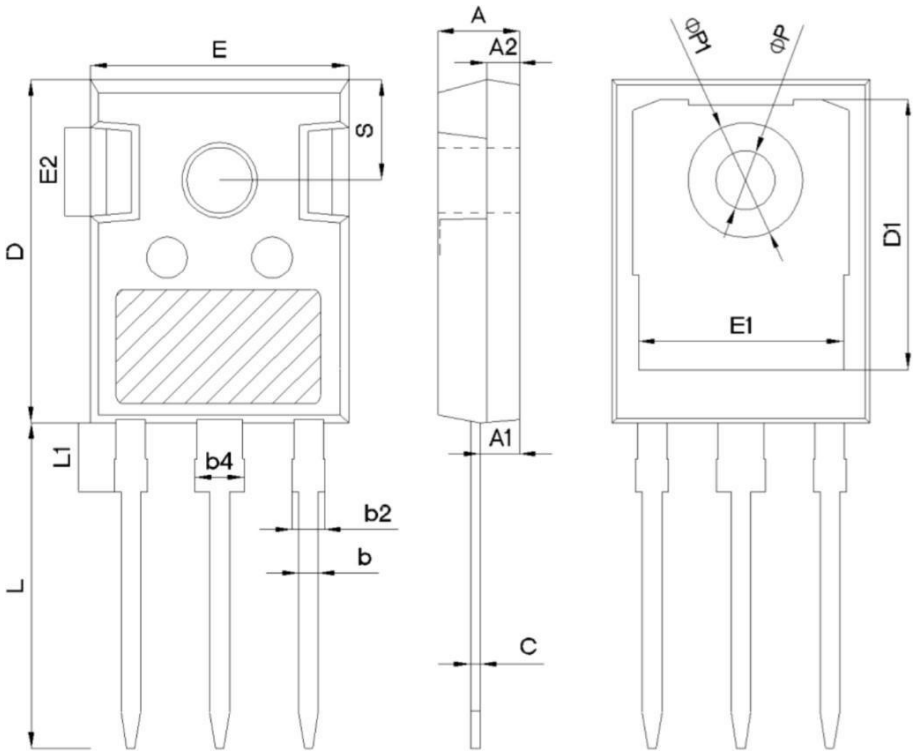

SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		

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修订历史/Revision History：

修订 /Revision	主题（自上次修订以来的主要变化） /Subjects (major changes since last revision)	日期 /Date
1.0	Initial Version	2020-11-27
2.0	Update the English and Chinese versions	2023-04

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