QMW30N120E

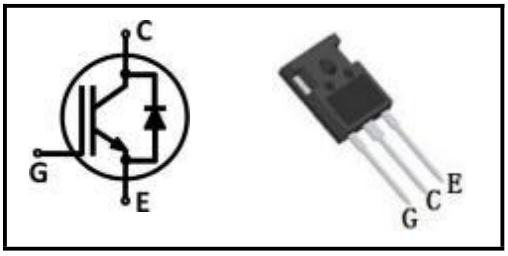
1200V-30A Trench and Field Stop IGBT

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 reliability and thermal stability, good parameter consistency

应用领域/Applications

- 焊接/ **Welding**



型号/Type	打标/Marking	封装/Package
QMW30N120E	QM30N120E	TO-247

最大额定值/Maximum Rated Values

Item	Symbol	Value	Unit
集电极-发射极电压 Collector- emitter voltage	V_{CE}	1200	V
集电极电流 DC collector current, limited by T_{vjmax} T_C=25℃ T_C=130℃	I_C	 60 30	A
集电极脉冲电流 Pulsed collector current, t_p limitedby Tjmax1)	I_{Cpuls}	120	
二极管正向电流 Diode forward current, limited by T_{jmax} T_C=25℃ T_C=100℃	I_F	 30 15	
二极管脉冲电流 Diode pulsed current, t_p limited by T_{jmax}1)	I_{Fpuls}	60	
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,D<0.01)		±30	
耗散功率 Power dissipation T_C=25℃ T_C=130℃	P_{tot}	333 166	W
工作结温 Operating junction temperature	T_j	-40~175	℃
储存温度 Storage temperature	T_{stg}	-55~150	
焊接温度 Soldering temperature,wave soldering 1.6mm (0.063in.) from case for 10s		260	
安装扭矩，M3 螺钉最大安装过程：3 Mounting torque, M3 screw Maximum of mounting processes: 3	M	0.6	Nm

1) Defined by design. Not subject to production test.

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	1200	-	-	V
集电极－发射极饱和电压 Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=30A T_j=25℃	-	1.60	2.10	
		T_j=150℃	-	2.55	-	
		T_j=175℃	-	2.40	-	
阈值电压 G-E threshold voltage	$V_{GE(th)}$	I_C=1.2mA, V_{CE}=V_{GE}	5.0	5.8	6.5	
集电极-发射极漏电流 C-E leakage current	I_{CES}	V_{CE}=1200V, V_{GE}=0V T_j=25℃	-	-	0.01	mA
		T_j=175℃	-	-	4.0	
栅极-发射极漏电流 G-E leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V	-	-	100	nA

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	-	7100	-	pF
输出电容 Output capacitance	C_{oss}		-	100	-	
反馈电容 Reverse transfer capacitance	C_{rss}		-	66	-	
栅电荷 Gate charge	Q_G	V_{CC}=400V, I_C=30A, V_{GE}=15V	-	365	-	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}	-	-	-	0.45	K/W
二极管结－外壳热阻 Diode thermal resistance, junction-case	R_{thJCD}	-	-	-	1.2	
结-环境热阻 Thermal Resistance, junction-ambient	R_{thJA}	-	-	-	40	

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}=600V, I_C=30A, V_{GE}=0/15V, R_G=10Ω, Inductive load	-	91	-	ns
上升时间 Rise time	t_r		-	68	-	
关断延迟时间 Turn-off delay time	$t_{d(off)}$		-	471	-	
下降时间 Fall time	t_f		-	77	-	
开通损耗 Turn-on energy	E_{on}		-	1.91	-	mJ
关断损耗 Turn-off energy	E_{off}		-	1.30	-	
开关损耗 Total switching energy	E_{ts}		-	3.21	-	
开通延迟时间 Turn-on delay time	$t_{d(on)}$	T_j=175℃, V_{CC}=600V, I_C=30A, V_{GE}=0/15V, R_G=10Ω, Inductive load	-	87	-	ns
上升时间 Rise time	t_r		-	71	-	
关断延迟时间 Turn-off delay time	$t_{d(off)}$		-	543	-	
下降时间 Fall time	t_f		-	126	-	
开通损耗 Turn-on energy	E_{on}		-	2.30	-	mJ
关断损耗 Turn-off energy	E_{off}		-	1.72	-	
开关损耗 Total switching energy	E_{ts}		-	4.02	-	

二极管开关特性/Diode Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
二极管正向压降 Diode forward voltage	V_F	V_{GE}=0V,I_F=15A T_j=25℃	-	2.35	-	V
		T_j=150℃	-	2.05	-	
		T_j=175℃	-	2.0	-	
反向恢复时间 Diode reverse recovery time	t_{rr}	T_j=25℃, V_R=400V, I_F=15A, di_F/dt=600A/μs	-	184	-	ns
反向恢复电荷 Diode reverse recovery charge	Q_{rr}		-	0.94	-	μC
反向恢复峰值电流 Diode peak reverse recovery current	I_{rrm}		-	10.4	-	A
反向恢复时间 Diode reverse recovery time	t_{rr}	T_j=150℃, V_R=400V, I_F=15A, di_F/dt=600A/μs	-	303	-	ns
反向恢复电荷 Diode reverse recovery charge	Q_{rr}		-	3.41	-	uC
反向恢复峰值电流 Diode peak reverse recovery current	I_{rrm}		-	20.8	-	A

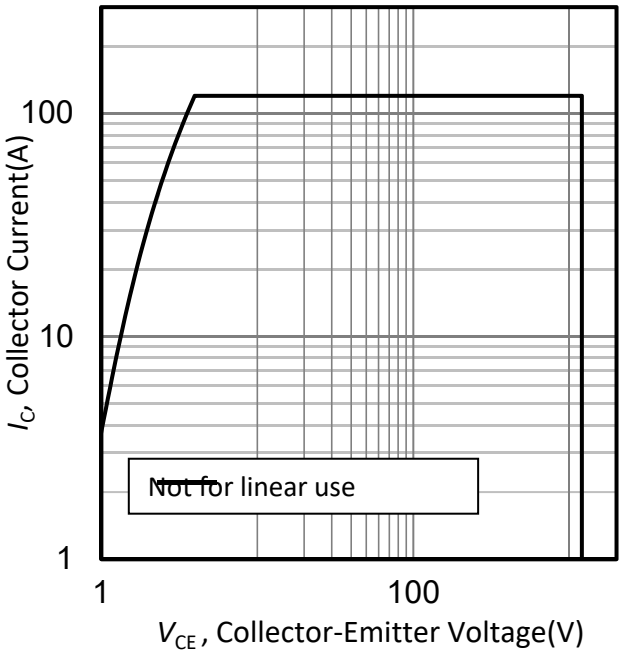


Figure 1..正向偏置安全工作区/Forward bias safe operating area

(D=0, T_C=25 ℃, T_{vj}≤175℃,V_{GE}=15V)

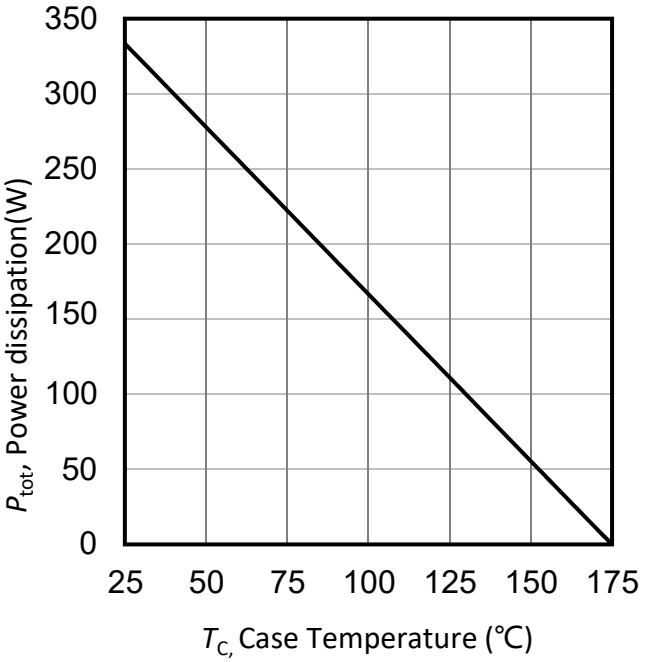


Figure 2. 功耗与外壳温度的关系/Power dissipation as a function of case temperature

(T_{vj}≤175℃)

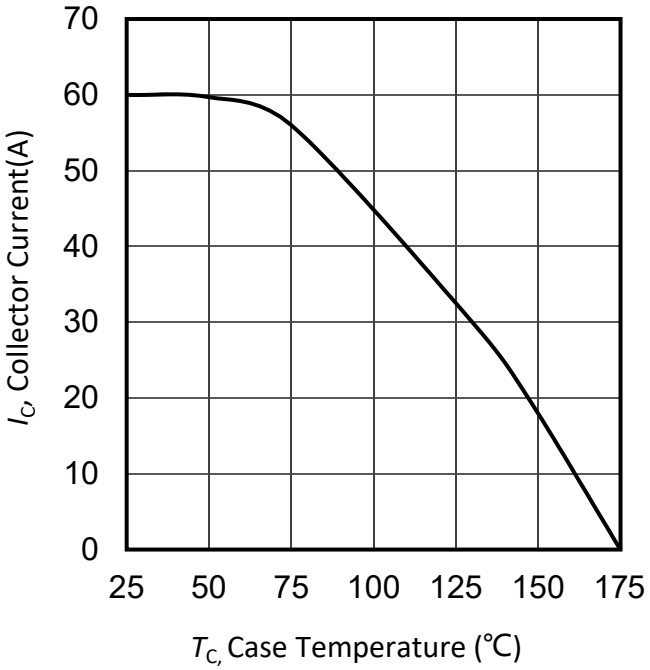


Figure 3. 集电极电流与外壳温度的关系/Collector current as a function of case temperature

(T_{vj}≤175℃ ,V_{GE}≥15V)

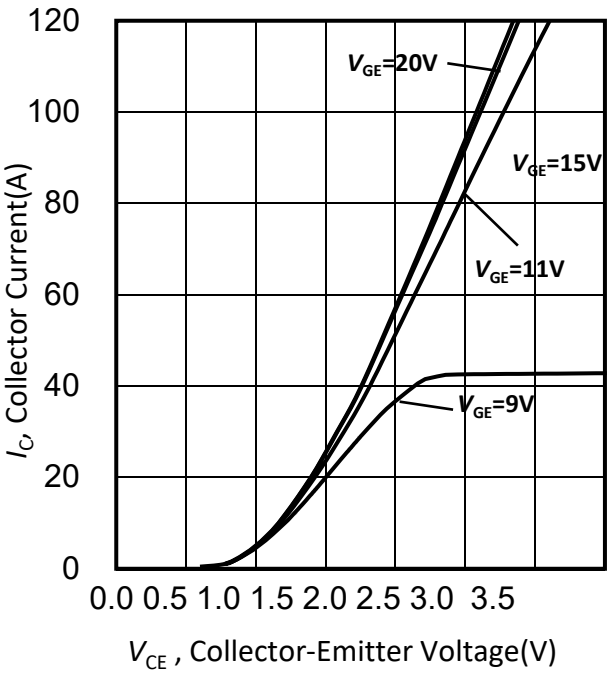


Figure 4. 典型输出特性/Typical output characteristic

(T_{vj}=25℃)

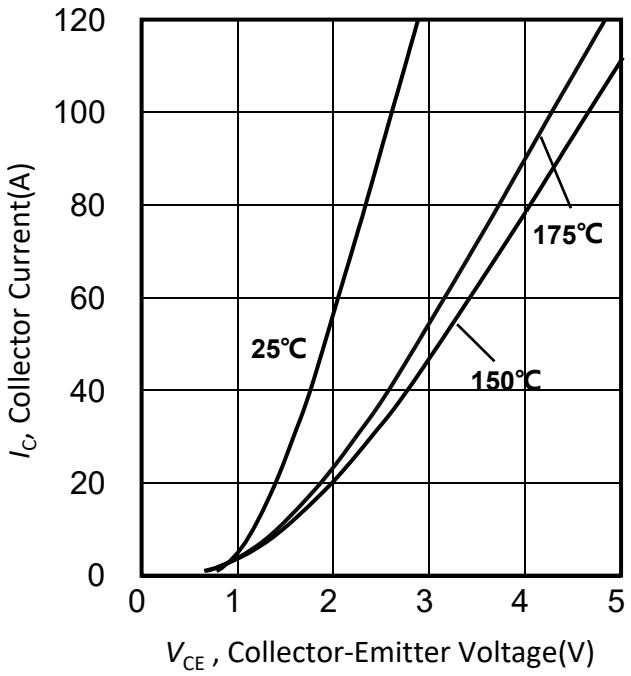


Figure 5. 集电极-发射极饱和电压特性 **/Collector-emitter saturation voltage characteristic** (V_{GE}=15V)

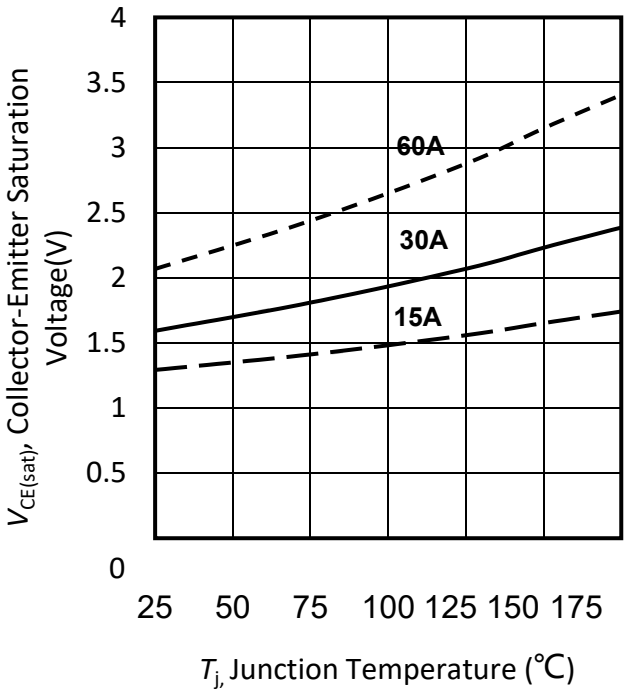


Figure 6. 典型集电极-发射极饱和电压与结温的关系 **/Typical collector-emitter saturation voltage as a function of junction temperature** (V_{GE}=15V)

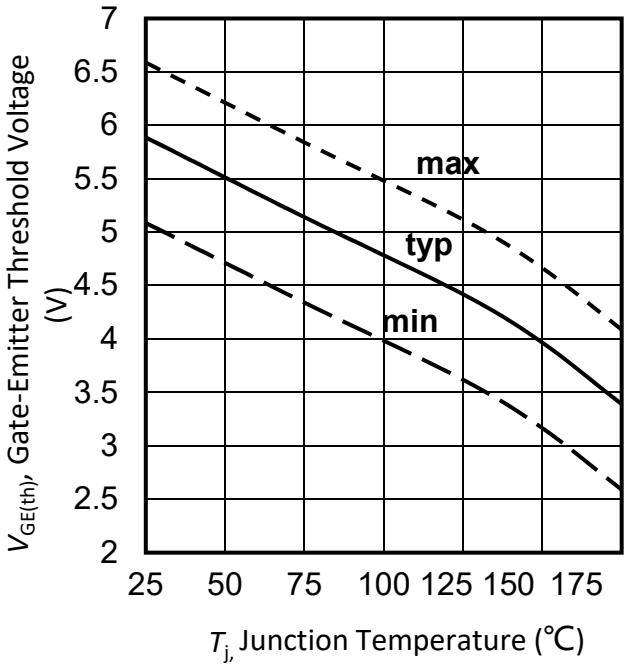


Figure 7. 栅极-发射极阈值电压与结温的关系 **/Gate-emitter threshold voltage as a function of junction temperature** (I_C=1.2mA)

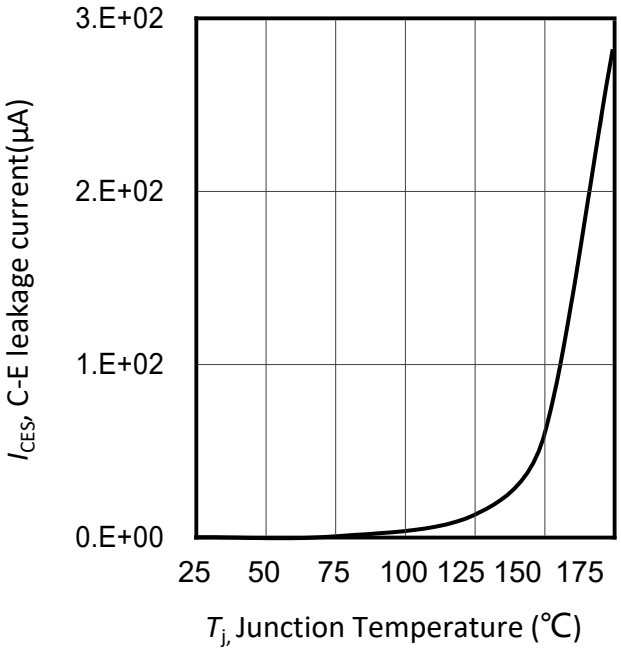


Figure 8. 典型 C-E 漏电流与结温的关系 **/Typical C-E leakage current as a function of junction temperature** (V_{CE}=1200V, V_{GE}=0V)

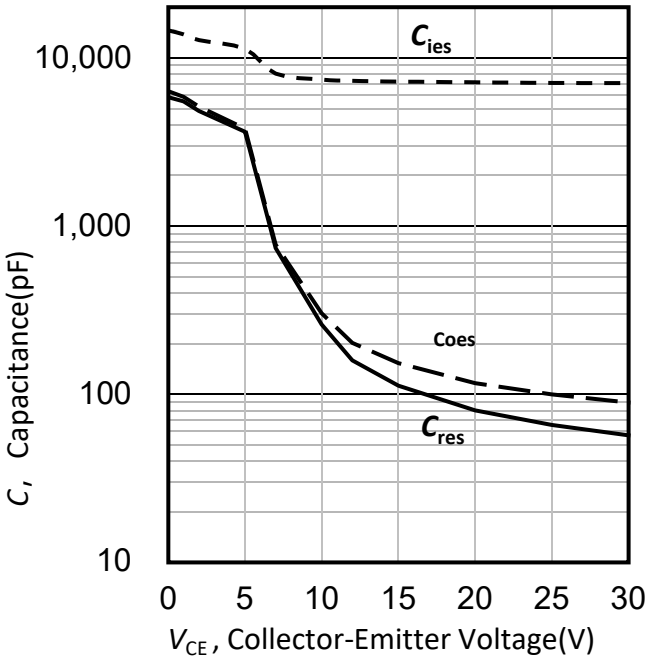


Figure 9. 典型电容与集电极-发射极电压的关系/Typical capacitance as a function of collector-emitter voltage (V_{GE}=0V, f=1MHz)

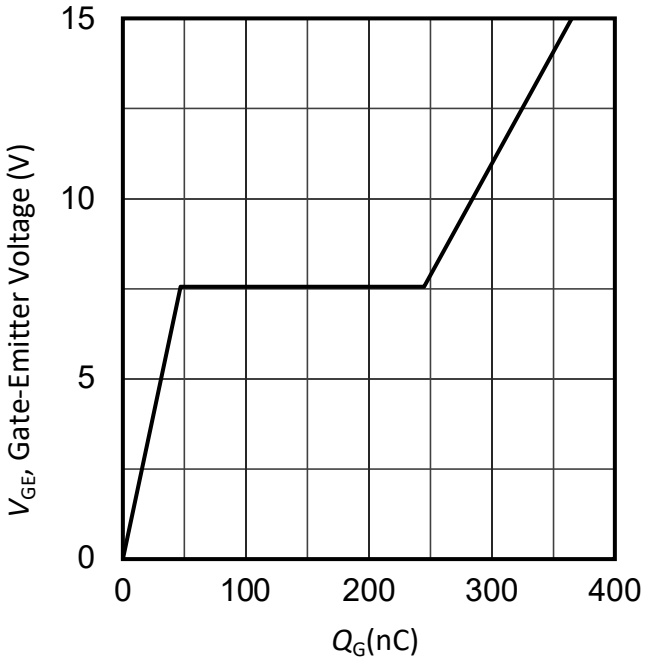


Figure 10. 典型栅极电荷/Typical gate charge

(V_{CC}=400V, I_C=30A)

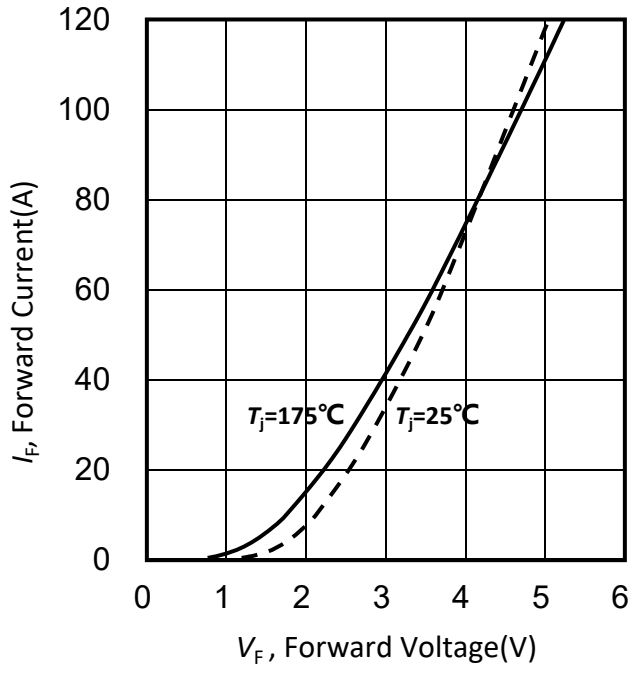


Figure 11. 典型二极管正向电流与正向电压的函数关系/Typical diode forward current as a function of forward voltage

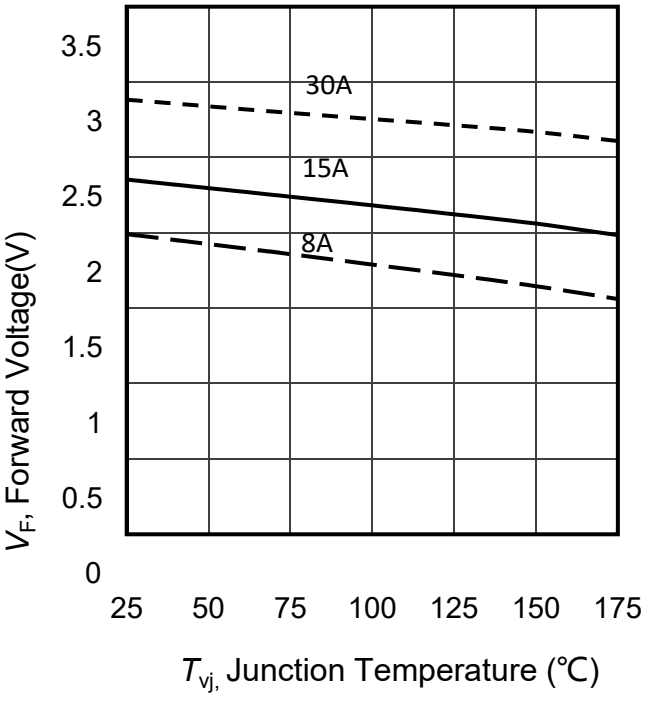


Figure 12. 典型二极管正向电压与结温的关系/Typical diode forward voltage as a function of junction temperature

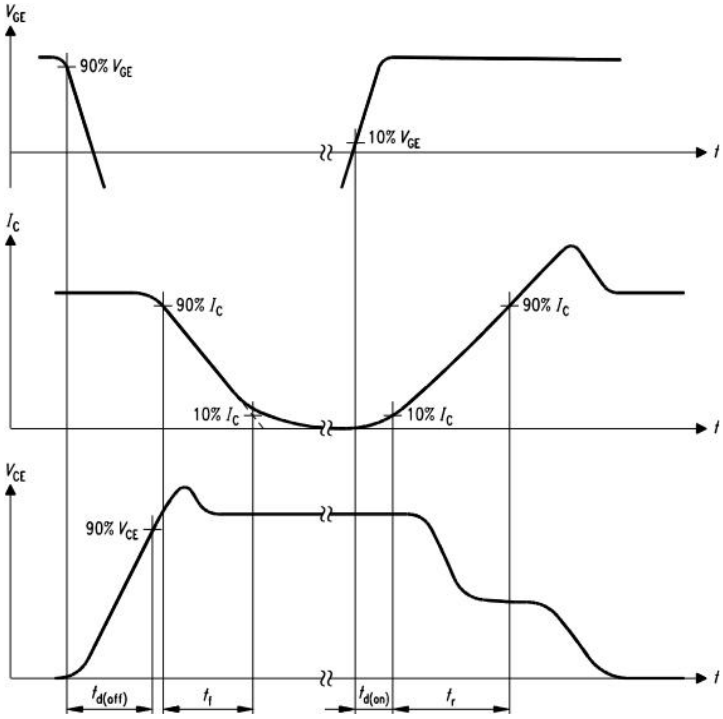


Figure A. 开关时间的定义/Definition of switching times

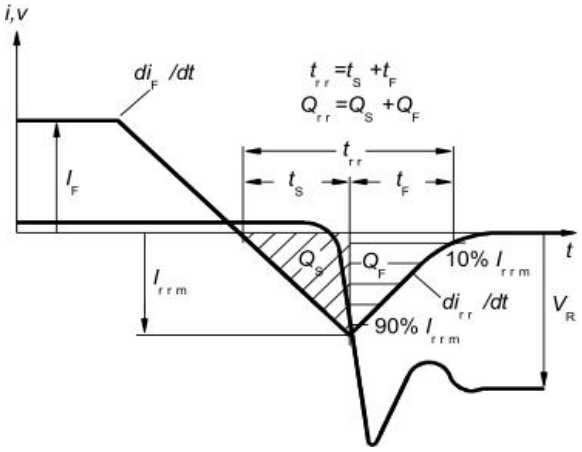


Figure C. 二极管开关特性的定义/Definition of diodes switching characteristics

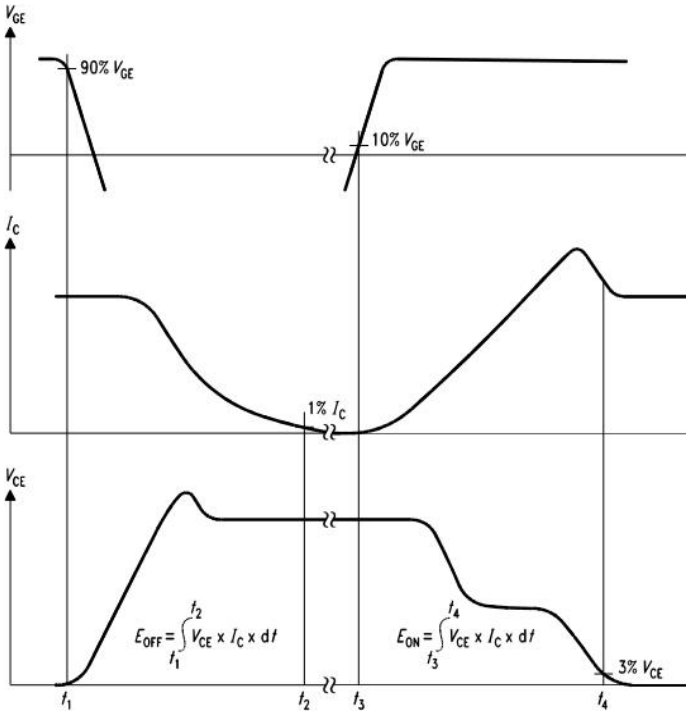


Figure B. 开关损耗的定义/ Definition of switching losses

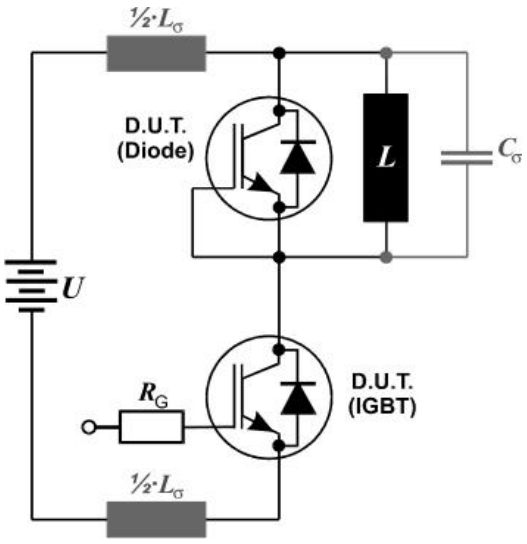
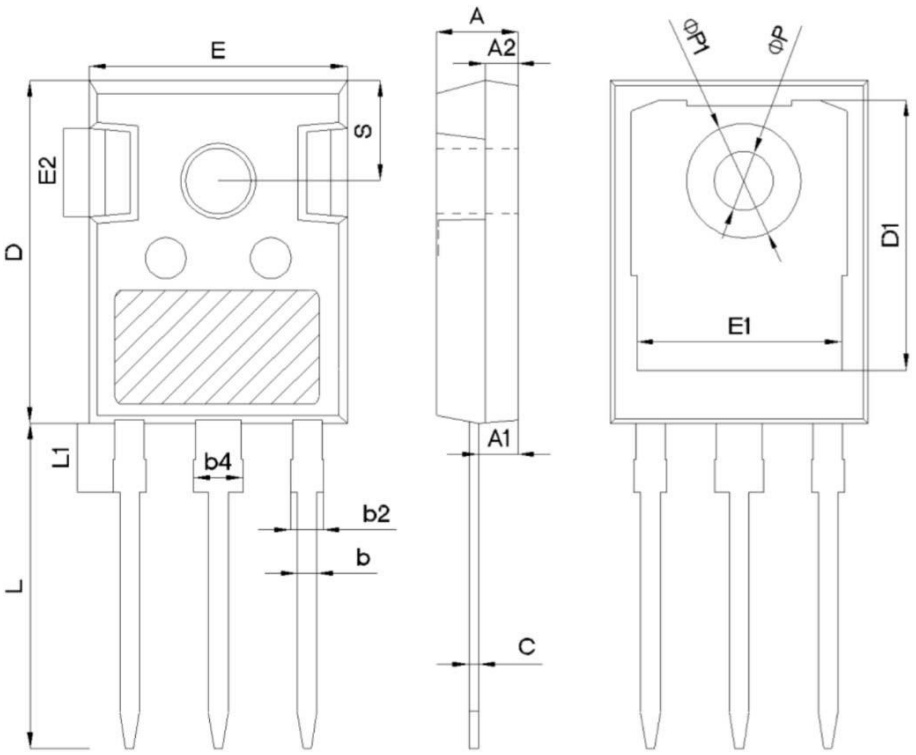


Figure D. 开关测试电路/Switching test circuit

TO-247



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
b_2	1.91	2.01	2.21
b_4	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		

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	2022-09
2.0	Update the English and Chinese versions	2023-04

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