

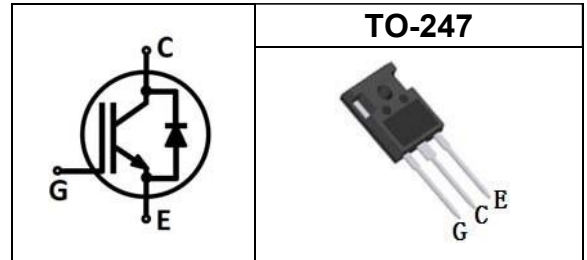
特征/Features

- 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

型号/Type	打标/Marking	封装/Package
QMW15N120BF	QMW15N120BF	TO-247

应用领域/Applications

- 通用变频/Universal frequency conversion
- 不间断电源/UPS



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}	1200	V
集电极电流 DC collector current, limited by T_{jmax} $T_C=25^\circ C$ $T_C=100^\circ C$	I_C	30 15	A
集电极脉冲电流 Pulsed collector current, t_p limited by T_{vjmax}^1	I_{Cpuls}	60	
二极管正向电流 Diode forward current, limited by T_{vjmax} $T_C=25^\circ C$ $T_C=100^\circ C$	I_F	30 15	
二极管脉冲电流 Diode pulsed current, t_p limited by T_{vjmax}^1	I_{Fpuls}	60	V
栅极-发射极电压 Gate-emitter voltage	V_{GE}	± 20	
瞬态栅极-发射极电压 Transient Gate-emitter voltage ($t_p \leq 10\mu s, D < 0.01$)		± 30	
短路承受时间 Short circuit withstand time $V_{GE}=15V, V_{CC}=600V, T_j \leq 150^\circ C$	t_{sc}	10	μs
耗散功率 Power dissipation $T_C=25^\circ C$ $T_C=100^\circ C$	P_{tot}	214 107	W
工作结温 Operating junction temperature	T_j	- 40~175	$^\circ C$
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.

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}	-	-	-	0.7	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	

电学特性/Electrical Characteristics

静态特性/Static Characteristics (at $T_j=25^\circ\text{C}$ 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	$V_{CE(sat)}$	$V_{GE}=15V, I_C=15A$ $T_j=25^\circ\text{C}$ $T_j=150^\circ\text{C}$ $T_j=175^\circ\text{C}$	- - -	1.8 2.2 2.3	2.2 - -	
二极管正向压降 Diode forward voltage	V_F	$V_{GE}=0V, I_F=15A$ $T_j=25^\circ\text{C}$ $T_j=150^\circ\text{C}$ $T_j=175^\circ\text{C}$	- - -	2.0 1.6 1.5	- - -	
阈值电压 G-E threshold voltage	$V_{GE(th)}$	$I_C=1mA, V_{CE}=V_{GE}$	5.0	5.8	6.5	
集电极-发射极漏电流 C-E leakage current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V$ $T_j=25^\circ\text{C}$ $T_j=175^\circ\text{C}$	- -	- -	0.1 4.0	mA
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}	$V_{CE}=20V, I_C=15A$	-	10	-	S

动态特性/Dynamic Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
输入电容 Input capacitance	C_{iss}	$V_{CE}=25V, V_{GE}=0V, f=1MHz$	-	1185	-	pF
输出电容 Output capacitance	C_{oss}		-	81	-	
反馈电容 Reverse transfer capacitance	C_{rss}		-	35	-	
栅电荷 Gate charge	Q_G	$V_{CC}=600V, I_C=15A, V_{GE}=15V$	-	94	-	nC
短路集电极电流 Short circuit collector current	$I_{C(SC)}$	$V_{GE}=15V, t_{SC}\leq 10\mu s, V_{CC}=600V, T_j=175^\circ\text{C}$	-	60	-	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	$t_{d(on)}$	$T_j=25\text{ }^\circ\text{C}$, $V_{CC}=600\text{V}$, $I_C=15\text{A}$, $V_{GE}=0\text{V}/15\text{V}$, $R_G=10\Omega$, <i>Inductive load</i>	-	56	-	ns	
上升时间 Rise time	t_r		-	65	-		
关断延迟时间 Turn-off delay time	$t_{d(off)}$		-	226	-		
下降时间 Fall time	t_f		-	156	-		
开通损耗 Turn-on energy	E_{on}		-	1.17	-		mJ
关断损耗 Turn-off energy	E_{off}		-	0.95	-		
开关损耗 Total switching energy	E_{ts}	-	2.12	-			
开通延迟时间 Turn-on delay time	$t_{d(on)}$	$T_j=125\text{ }^\circ\text{C}$, $V_{CC}=600\text{V}$, $I_C=15\text{A}$, $V_{GE}=0\text{V}/15\text{V}$, $R_G=10\Omega$, <i>Inductive load</i>	-	48	-	ns	
上升时间 Rise time	t_r		-	63	-		
关断延迟时间 Turn-off delay time	$t_{d(off)}$		-	312	-		
下降时间 Fall time	t_f		-	266	-		
开通损耗 Turn-on energy	E_{on}		-	1.28	-		mJ
关断损耗 Turn-off energy	E_{off}		-	1.55	-		
开关损耗 Total switching energy	E_{ts}	-	2.83	-			

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}	$T_j=25\text{ }^\circ\text{C}$, $V_R=600\text{V}$, $I_F=15\text{A}$, $di_F/dt=170\text{A}/\mu\text{s}$	-	153	-	ns
反向恢复电荷 Diode reverse recovery charge	Q_{rr}		-	0.44	-	μC
反向恢复峰值电流 Diode peak reverse recovery current	I_{rrm}		-	6.2	-	A
反向恢复时间 Diode reverse recovery time	t_{rr}	$T_j=175\text{ }^\circ\text{C}$, $V_R=600\text{V}$, $I_F=15\text{A}$, $di_F/dt=170\text{A}/\mu\text{s}$	-	400	-	ns
反向恢复电荷 Diode reverse recovery charge	Q_{rr}		-	2.3	-	μC
反向恢复峰值电流 Diode peak reverse recovery current	I_{rrm}		-	14	-	A

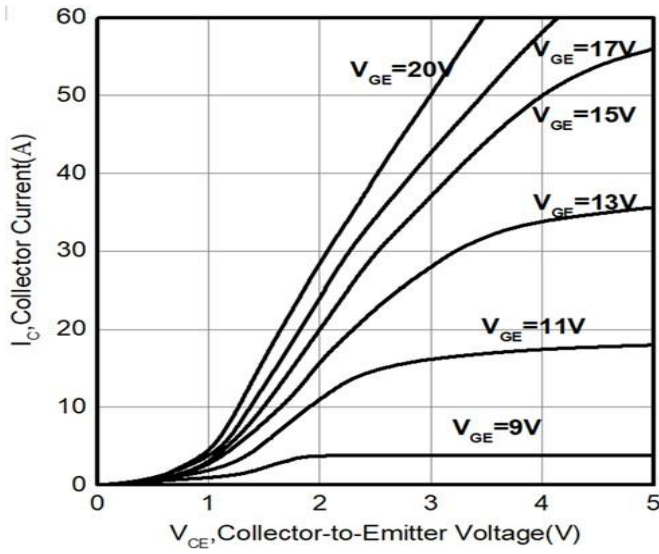


Figure 1. 典型输出特性/
Typical output characteristic ($T_j = 25^\circ\text{C}$)

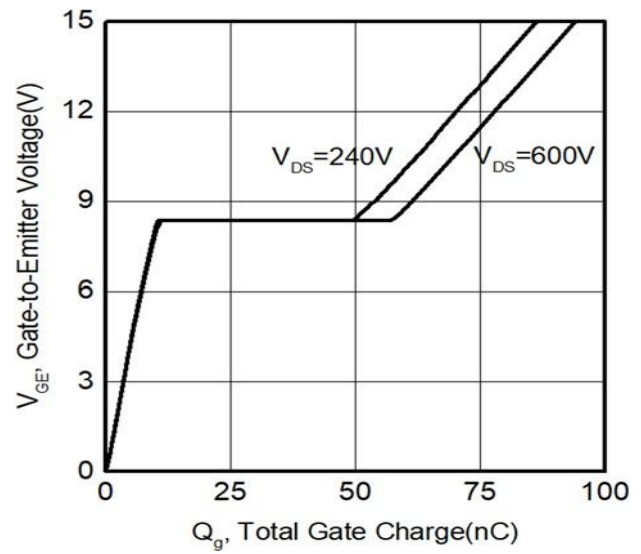


Figure 2. 典型栅极电荷/Typical gate charge

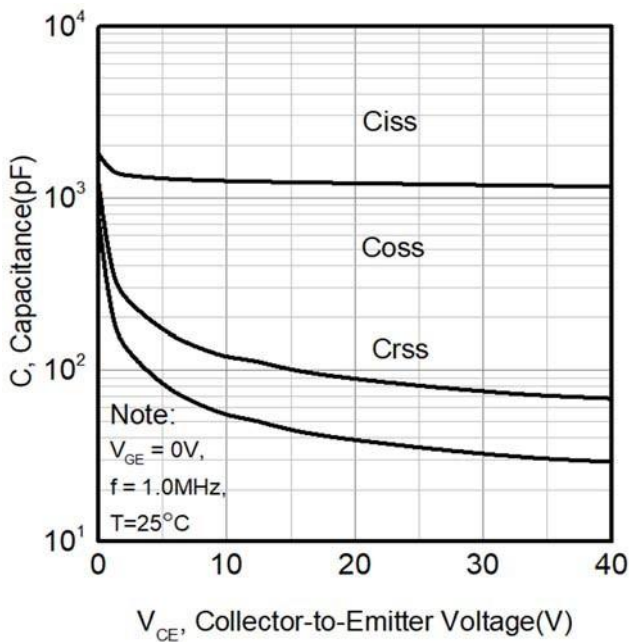


Figure 3. 典型电容与集电极-发射极电压的关系
/Typical capacitance as a function of collector-emitter voltage ($V_{GE} = 0\text{V}$, $f = 1\text{MHz}$)

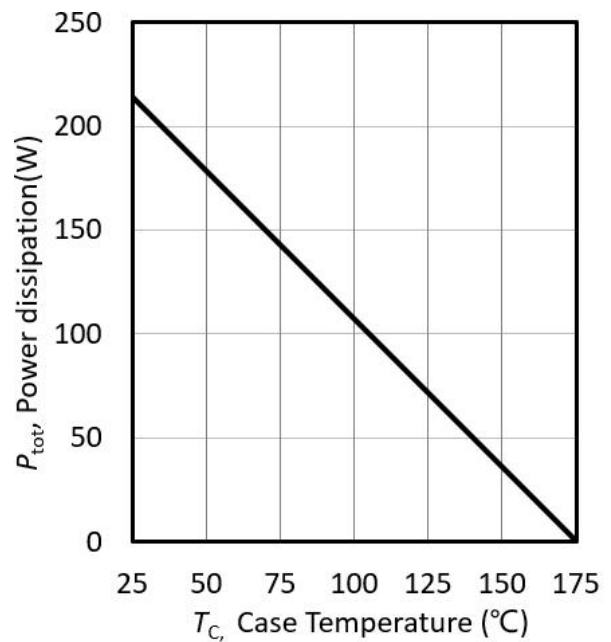


Figure 13. 功耗与外壳温度的关系/Power dissipation as a function of case temperature ($T_j \leq 175^\circ\text{C}$)

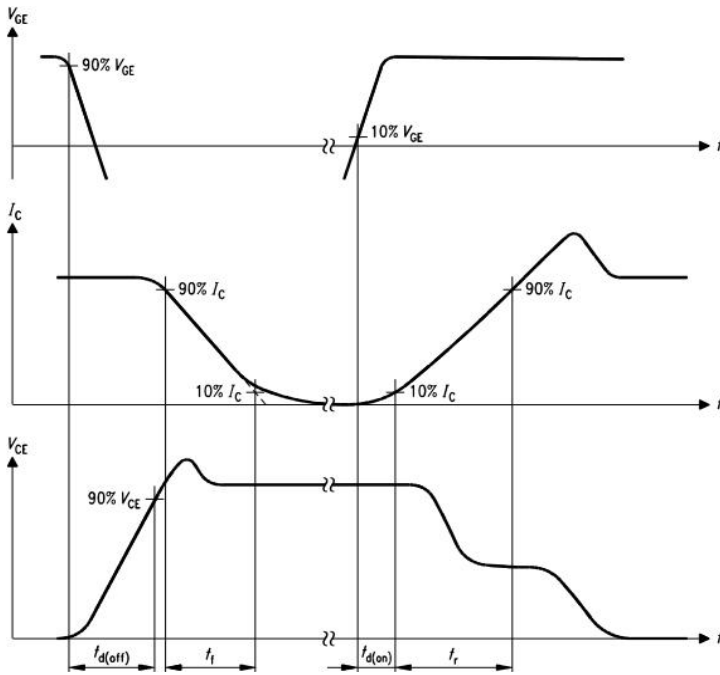


Figure A 开关时间的定义/
IGBT switching time definition

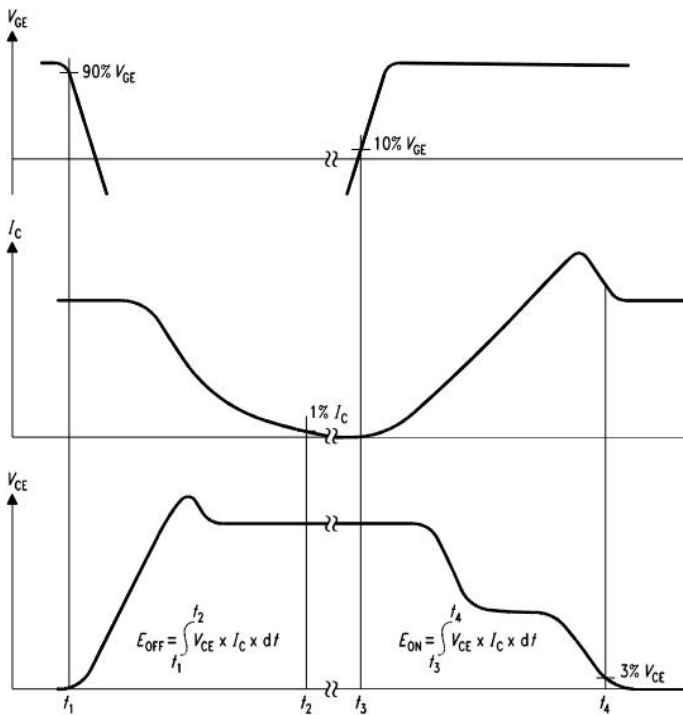


Figure B 开关损耗的定义/
IGBT switching loss definition

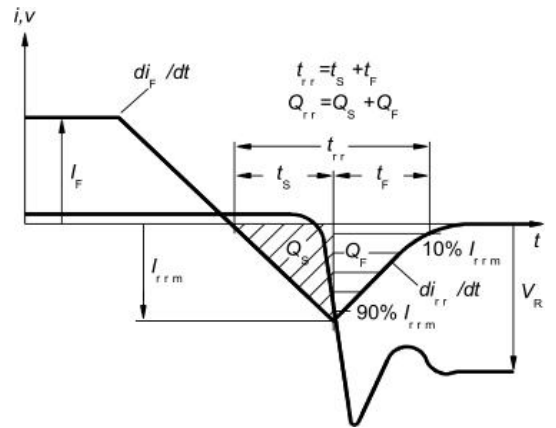


Figure C 二极管开关特性的定义/Diode reverse recovery parameter definition

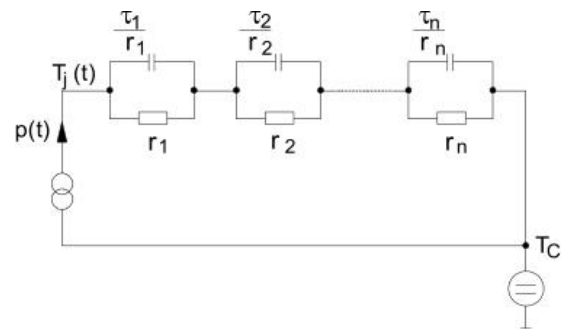


Figure D 热等效电路Thermally equivalent circuit

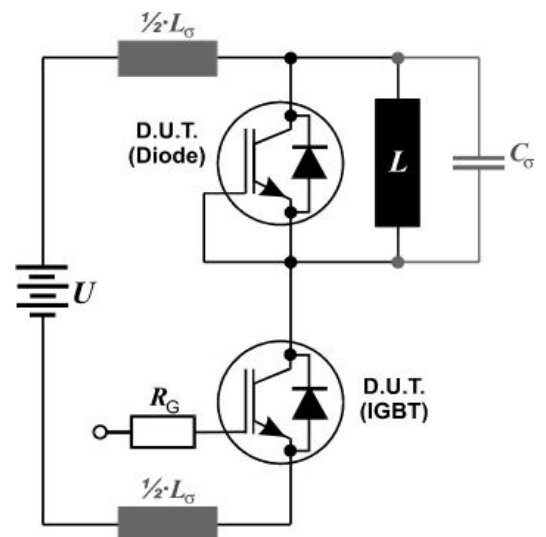
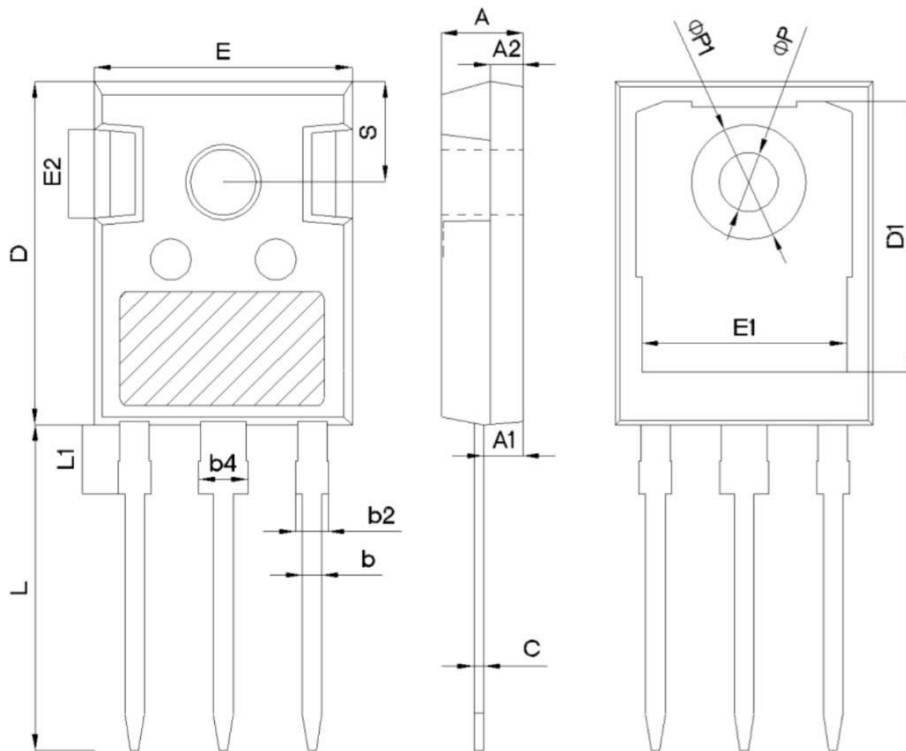


Figure E 开关测试电路/Switch Parameter test circuit

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
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		

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	2022-06
2.0	Update the English and Chinese versions	2023-04

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