

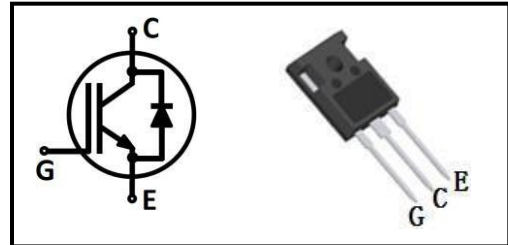
特征/Features

- 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}
- 内置快速恢复二极管
Built-in fast recovery diode
- 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

型号/Type	打标/Marking	封装/Package
QMW60N60D	QM60N60D	TO - 247

应用领域/Applications

- 逆变焊机/Inverter welder



最大额定值/Maximum Rated Values¹

Item	Symbol	Value	Unit
集电极-发射极电压 Collector-emitter voltage	V_{CE}	600	V
集电极电流 DC collector current, limited by T_{vjmax}^2 $T_C=25^\circ C$ $T_C=100^\circ C$	I_C	80 60	A
集电极脉冲电流 Pulsed collector current, t_p limited by T_{vjmax}^3	I_{Cpuls}	180	
二极管正向电流 Diode forward current, limited by T_{vjmax}^2 $T_C=25^\circ C$ $T_C=100^\circ C$	I_F	60 30	
二极管脉冲电流 Diode pulsed current, t_p limited by T_{vjmax}^3	I_{Fpuls}	150	
栅极-发射极电压 Gate-emitter voltage	V_{GE}	± 20	V
耗散功率 Power dissipation $T_C=25^\circ C$ $T_C=100^\circ C$	P_{tot}	357 142	W
工作结温 Operating junction temperature	T_j	- 55~150	°C
储存温度 Storage temperature	T_{stg}	- 55~150	

1: Test standard reference JESD-022 ;

2: limited by the maximum junction temperature, 80A current value is limited by the bonding Line;

3: pulse width is limited by the maximum junction temperature;

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}	-	-	-	0.35	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	$V_{(BR)CES}$	$V_{GE}=0V,$ $I_C=0.25mA$	600	-	-	V
集电极-发射极饱和电压 Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE}=15V,$ $I_C=60A$ $T_j=25^\circ\text{C}$	-	1.8	2.2	
二极管正向压降 Diode forward voltage	V_F	$V_{GE}=0V, I_F=30A$ $T_j=25^\circ\text{C}$	-	1.4	1.8	
阈值电压 G-E threshold voltage	$V_{GE(th)}$	$I_C=1mA,$ $V_{CE}=V_{GE}$	5.0	6.0	7.0	
集电极-发射极漏电流 C-E leakage current	I_{CES}	$V_{CE}=600V,$ $V_{GE}=0V$ $T_j=25^\circ\text{C}$ $T_j=150^\circ\text{C}$	-	-	0.01 1.0	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}	$V_{CE}=20V,$ $I_C=60A$	-	21	-	S

动态特性/Dynamic Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
输入电容 Input capacitance	C_{iss}	$V_{CE}=30V,$ $V_{GE}=0V,$ $f=1MHz$	-	7095	-	pF
输出电容 Output capacitance	C_{oss}		-	192	-	
反馈电容 Reverse transfer capacitance	C_{rss}		-	97	-	
栅电荷 Gate charge	Q_G	$V_{CC}=400V,$ $I_C=60A,$ $V_{GE}=15V$	-	364	-	nC

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	$t_{d(on)}$	$T_j=25^{\circ}\text{C}$, $V_{CC}=400\text{V}$, $I_C=60\text{A}$, $V_{GE}=0/15\text{V}$, $R_G=10\Omega$, Inductive load	-	90	-	ns	
上升时间 Rise time	t_r		-	209	-		
关断延迟时间 Turn-off delay time	$t_{d(off)}$		-	280	-		
下降时间 Fall time	t_f			-	95	-	
开通损耗 Turn-on energy	E_{on}			-	4.3	-	mJ
关断损耗 Turn-off energy	E_{off}			-	1.6	-	
开关损耗 Total switching energy	E_{ts}			-	5.9	-	

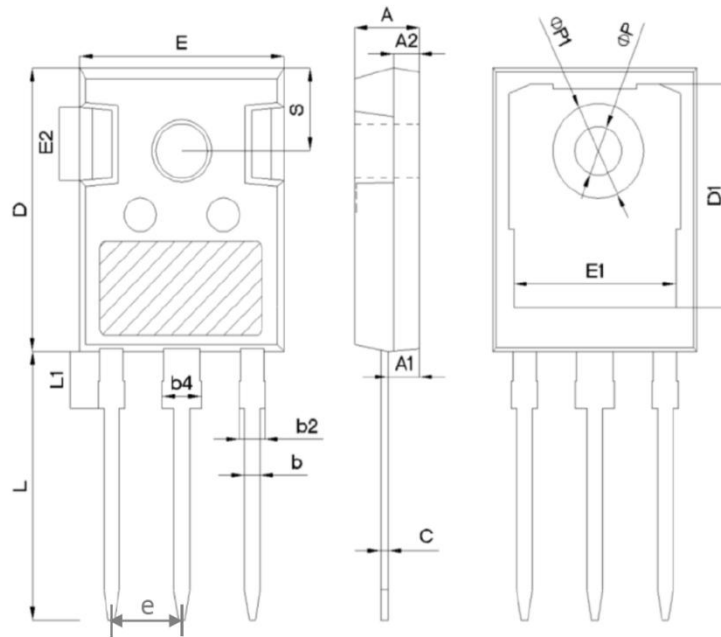
二极管开关特性/Diode Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
反向恢复时间 Diode reverse recovery time	t_{rr}	$T_j=25^{\circ}\text{C}$, $V_R=400\text{V}$, $I_F=30\text{A}$, $di_F/dt=450\text{A}/\mu\text{s}$	-	104	-	ns
反向恢复电荷 Diode reverse recovery charge	Q_{rr}		-	0.82	-	μC
反向恢复峰值电流 Diode peak reverse recovery current	I_{rrm}		-	13.5	-	A

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

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		

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