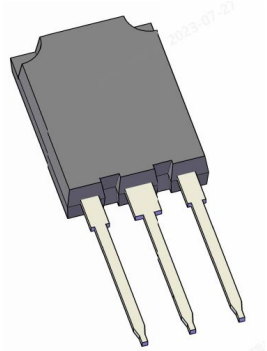
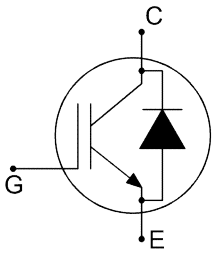
Q package: 750V 200A IGBT and emitter controlled diode





等效电路图
Equivalent Circuit Schematic

Features:

- 750V 200A, $V_{CE(sat)}$ =1.35V@25℃
- Micro pattern trench/FS technology
- Low switching losses
- High SC capability
- High reliability
- High creepage distance

产品特性:

- 750V 200A, $V_{CE(sat)}$ = 1.35V@25℃
- 微沟槽/场终止技术
- 低开关损耗
- 高短路能力
- 高可靠性
- 高爬电距离

Typical Applications：

- Automotive Applications
- Motor Drives
- Inverters

典型应用：

- 汽车应用
- 电机驱动
- 逆变器

Product validation：

- Qualified for automotive applications
- Qualified according to AEC-Q101

产品验证：

- 车规产品
- 符合 AEC-Q101 标准

Package

Characteristic Values / 性能参数

			min.	typ.	max.	
Internal emitter inductance measured 5 mm from case 距离外壳 5mm 的内部发射器电感测量		L_E		13.0		nH
Storage temperature 存储温度		T_{stg}	-55		150	℃
Soldering temperature 焊接温度	Wave soldering 1.6mm from case for 10s				260	℃
Thermal resistance,junction-ambient 结-环境热阻		$R_{th(j-a)}$			40	K/W

IGBT, Inverter / IGBT，逆变部分

Maximum Rated Values / 最大标称参数

Collector-emitter voltage 集电极-发射极电压		V_{CE}	750	V
Continuous DC collector current,limited by T_{vjmax} 集电极连续直流电流,受 T_{vjmax} 限制	T_C=25℃	I_C	200	A
	T_C=100℃		200	A
Pulsed collector current,t_p limited by T_{vjmax} 脉冲集电极电流，t_p 受 T_{vjmax} 限制		I_{Cpulse}	400	A
Turn-off safe operating area 关断安全操作区域	V_{CE}≤750V，t_p=1μs,T_{vj}≤175℃		400	A
Gate-emitter voltage 栅极发射极电压		V_{GE}	±20	V
Transient gate-emitter voltage 瞬态栅极发射极电压	t_p < 0.1μs,D < 0.01	V_{GE}	±30	V
Short-circuit withstand time 短路耐受时间	Vcc≤470V，V_{GE}=15V,Allowed number of short circuits < 1000，Time between short circuits≥ 1.0s,T_{vj}=25℃	t_{SC}	5	us
Power dissipation 功率损耗	T_C=25℃	P_{tot}	2500	W
	T_C=100℃		1200	

Characteristic Values / 性能参数

				min.	typ.	max.	
Collector-emitter saturation voltage 集电极-发射极饱和压降	I_C=200A，V_{GE}=15V	T_{vj}=25℃ T_{vj}=175℃	V_{CEsat}		1.35 1.50		V
Gate-emitter threshold voltage 门极阈值电压	V_{CE}=V_{GE}，I_C=4mA	T_{vj}=25℃	V_{GEth}	5.00	6.00	7.00	V
Zero gate-voltage collector curren 零栅极电压集电极电流	V_{CE}=750V,V_{GE}=0V	T_{vj}=25℃	I_{CES}			200	uA
		T_{vj}=175℃			6000		
Gate-emitter leakage current 门极-发射极漏电流	V_{CE}=0V,V_{GE}=20V	T_{vj}=25℃	I_{GES}			200	nA
Transconductance 跨导	I_C=200A，V_{CE}=15V		g_{fs}		/		S

Short-circuit collector current 短路集电极电流	Vcc≤470V，V_{GE}=15V,t_{sc}≤5μs,Allowed number of short circuits < 1000，Time between short circuits ≥1.0s,T_{vj}=25℃		I_{SC}		1030		A
Input capacitance 输入电容	V_{CE}=25V，V_{GE}=0V，f=100kHz	T_{vj}=25℃	C_{ies}	-	29.2	-	nF
Output capacitance 输出电容	V_{CE}=25V，V_{GE}=0V，f=100kHz	T_{vj}=25℃	C_{oes}	-	1.5	-	nF
Reverse transfer capacitance 反向传输电容	V_{CE}=25V，V_{GE}=0V，f=100kHz	T_{vj}=25℃	C_{res}	-	0.11	-	nF
Gate charge 门极电荷	V_{GE}=-8V~+15V，V_{CE}=400V		Q_G	-	1.1	-	μC
Turn-on delay time 开通延迟时间	I_C=200A,V_{CE}=470V V_{GE}= -8V/15V R_{Gon}=5.0Ω,R_{Goff}=12.0Ω L_σ=50nH,C_σ=30pF	T_{vj}=25℃ T_{vj}=175℃	t_{don}	-	69.6 173.0	-	ns
Rise time(inductive load) 上升时间(感性负载)	I_C=200A,V_{CE}=470V V_{GE}=-8V/15V R_{Gon}=5.0Ω,R_{Goff}=12.0Ω L_σ=50nH,C_σ=30pF	T_{vj}=25℃ T_{vj}=175℃	t_r	-	157 255	-	ns
Turn-off delay time 关断延迟时间	I_C=200A,V_{CE}=470V V_{GE}= -8V/15V , R_{Gon}=5.0Ω,R_{Goff}=12.0Ω L_σ=50nH,C_σ=30pF	T_{vj}=25℃ T_{vj}=175℃	t_{doff}	-	497 632	-	ns
Fall time(inductive load) 下降时间(感性负载)	I_C=200A,V_{CE}=470V V_{GE}= -8V/15V R_{Gon}=5.0Ω,R_{Goff}=12.0Ω L_σ=50nH,C_σ=30pF	T_{vj}=25℃ T_{vj}=175℃	t_f	-	84 128	-	ns
Turn-on energy 开通损耗	I_C=200A,V_{CE}=470V V_{GE}= -8V/15V R_{Gon}=5.0Ω,R_{Goff}=12.0Ω L_σ=50nH,C_σ=30pF	T_{vj}=25℃ T_{vj}=175℃	E_{on}	-	23 38.6	-	mJ
Turn-off energy 关断损耗	I_C=200A,V_{CE}=470V V_{GE}= -8V/15V R_{Gon}=5.0Ω,R_{Goff}=12.0Ω L_σ=50nH,C_σ=30pF	T_{vj}=25℃ T_{vj}=175℃	E_{off}	-	11.4 16.2	-	mJ
Total switching energy 总开关损耗	I_C=200A,V_{CE}=470V V_{GE}= -8V/15V R_{Gon}=5.0Ω,R_{Goff}=12.0Ω L_σ=50nH,C_σ=30pF	T_{vj}=25℃ T_{vj}=175℃	E_{ts}	-	34.4 54.8	-	mJ
IGBT Thermal resistance, junction to case IGBT 结-壳热阻			R_{thjc}	-	0.058	-	K/W
Operating junction Temperature 工作温度			T_{vj}	-40	-	175	℃

Diode, Inverter / 二极管，逆变部分

Maximum Rated Values / 最大标称参数

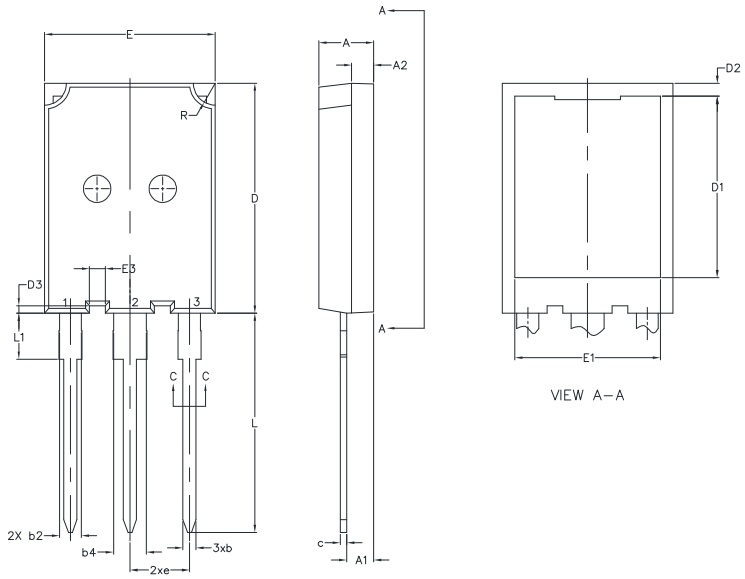
Diode forward current,limited by T_{vjmax} 二极管正向电流,受 T_{vjmax} 限制	T_C=25℃	I_F	200	A
	T_C=100℃		200	
Diode pulsed current,limited by T_{vjmax} 二极管脉冲电流,受 T_{vjmax} 限制		I_{Fpulse}	400	A
Power dissipation 功率耗散	T_C=25℃	P_{tot}	650	W
	T_C=100℃		320	

Characteristic Values / 性能参数

				min.	typ.	max.	
Diode Forward voltage[1)] 二极管正向电压	I_F=200A， V_{GE}=0V	Tvj=25℃ Tvj=175℃	V_F		1.74 1.67	1.9	V
Diode Recovery charge 二极管反向恢复电荷	I_F=200A, V_R < 470V, R_{Gon}=5 Ω -di$_F$/dt=992 A/μs(T_{vj}=25℃) -di$_F$/dt=794 A/μs(T_{vj}=175℃)	T_{vj}=25℃ T_{vj}=175℃	Q_R	-	4.5 11.6	-	μC
Diode peak reverse recovery current 二极管反向恢复峰值电流	I_F=200A, V_R < 470V,R_{Gon}=5 Ω -di$_F$/dt=992 A/μs(T_{vj}=25℃) -di$_F$/dt=794 A/μs(T_{vj}=175℃)	Tvj=25℃ T_{vj}=175℃	I_{rrm}	-	28 42	-	A
Reverse recovery energy 反向恢复损耗	V_R < 470V,V_{GE}= -8V/15V ,R_{Gon}=5.0Ω L_σ=40nH,C_σ=30pF, -di$_F$/dt=992 A/μs(T_{vj}=25℃) -di$_F$/dt=794 A/μs(T_{vj}=175℃)	T_{vj}=25℃ T_{vj}=175℃	E_{rec}	-	1.2 2.8	-	mJ
Diode thermal resistance, junction to case 二极管结-壳热阻			R_{thjc}	-	0.23	-	K/W
Operating junction Temperature 工作温度			T_{vj}	-40	-	175	℃

Package Dimension / 封装尺寸

Dimensions in Millimeters / 毫米为单位



SYMBOLS	DIMENSIONS			
	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A	4.90	5.10	0.193	0.201
A1	2.31	2.51	0.091	0.099
A2	1.90	2.10	0.075	0.083
b	1.16	1.26	0.046	0.050
b2	1.96	2.06	0.077	0.081
b4	2.96	3.06	0.117	0.120
c	0.59	0.66	0.023	0.026
D	20.90	21.10	0.823	0.831
D1	16.25	16.85	0.640	0.663
D2	1.05	1.35	0.041	0.053
D3	0.58	0.78	0.023	0.031
E	15.75	15.90	0.620	0.626
E1	13.26	—	0.552	—
E3	1.35	1.55	0.053	0.061
e	5.44BSC		0.214BSC	
L	19.80	20.10	0.780	0.791
L1	—	4.30	—	0.169
R	1.90	2.10	0.075	0.083