

IGBT, 制动-斩波器 / IGBT, Brake-Chopper
最大额定值 / Maximum Rated Values

集电极 - 发射极电压 Collector-emitter voltage	$T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = -50^{\circ}\text{C}$	V_{CES}	6500 6300 5700	V
连续集电极直流电流 Continuous DC collector current	$T_C = 80^{\circ}\text{C}, T_{vj\max} = 150^{\circ}\text{C}$	$I_{C\text{nom}}$	200	A
集电极重复峰值电流 Repetitive peak collector current	$t_P = 1\text{ms}$	I_{CRM}	400	A
总功率损耗 Total power dissipation	$T_C = 25^{\circ}\text{C}, T_{vj\max} = 150^{\circ}\text{C}$	P_{tot}	3,80	kW
栅极 - 发射极峰值电压 Gate-emitter peak voltage		V_{GES}	+/-20	V

特征值 / Characteristic Values

			min.	typ.	max.		
集电极 - 发射极饱和电压 Collector-emitter saturation voltage	$I_C = 200\text{A}, V_{GE} = 15\text{V}$ $I_C = 200\text{A}, V_{GE} = 15\text{V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$V_{CE\text{sat}}$	4,30 5,30	4,90 5,90	V V	
栅极阈值电压 Gate threshold voltage	$I_C = 35,0\text{mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		V_{GEth}	6,4	7,0	8,1	V
栅极电荷 Gate charge	$V_{GE} = -15\text{V} \dots +15\text{V}, V_{CE} = 3600\text{V}$		Q_G	2,80		μC	
内部栅极电阻 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		R_{Gint}	2,3		Ω	
输入电容 Input capacitance	$f = 1\text{MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{V}, V_{GE} = 0\text{V}$		C_{ies}	28,0		nF	
反向传输电容 Reverse transfer capacitance	$f = 1\text{MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{V}, V_{GE} = 0\text{V}$		C_{res}			nF	
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{CE} = 6500\text{V}, V_{GE} = 0\text{V}, T_{vj} = 25^{\circ}\text{C}$		I_{CES}	0,2		mA	
栅极-发射极漏电流 Gate-emitter leakage current	$V_{CE} = 0\text{V}, V_{GE} = 20\text{V}, T_{vj} = 25^{\circ}\text{C}$		I_{GES}		400	nA	
开通延迟时间(电感负载) Turn-on delay time, inductive load	$I_C = 200\text{A}, V_{CE} = 3600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Gon} = 13\Omega, C_{GE} = 22,0\text{nF}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	t_{don}	0,75 0,72		μs μs	
上升时间(电感负载) Rise time, inductive load	$I_C = 200\text{A}, V_{CE} = 3600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Gon} = 13\Omega, C_{GE} = 22,0\text{nF}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	t_r	0,37 0,40		μs μs	
关断延迟时间(电感负载) Turn-off delay time, inductive load	$I_C = 200\text{A}, V_{CE} = 3600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Goff} = 90\Omega, C_{GE} = 22,0\text{nF}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	t_{doff}	5,50 6,00		μs μs	
下降时间(电感负载) Fall time, inductive load	$I_C = 200\text{A}, V_{CE} = 3600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Goff} = 90\Omega, C_{GE} = 22,0\text{nF}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	t_f	0,40 0,50		μs μs	
开通损耗能量(每脉冲) Turn-on energy loss per pulse	$I_C = 200\text{A}, V_{CE} = 3600\text{V}, L_S = 280\text{nH}$ $V_{GE} = \pm 15\text{V}$ $R_{Gon} = 13\Omega, C_{GE} = 22,0\text{nF}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	E_{on}	1900		mJ mJ	
关断损耗能量(每脉冲) Turn-off energy loss per pulse	$I_C = 200\text{A}, V_{CE} = 3600\text{V}, L_S = 280\text{nH}$ $V_{GE} = \pm 15\text{V}$ $R_{Goff} = 90\Omega, C_{GE} = 22,0\text{nF}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	E_{off}	1200		mJ mJ	
短路数据 SC data	$V_{GE} \leq 15\text{V}, V_{CC} = 4400\text{V}$ $V_{CE\text{max}} = V_{CES} - L_{SCE} \cdot di/dt$ $t_P \leq 10\mu\text{s}, T_{vj} = 125^{\circ}\text{C}$		I_{SC}	1000		A	
结 - 外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT		R_{thJC}		33,0	K/kW	
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个 IGBT / per IGBT $\lambda_{\text{Paste}} = 1\text{W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1\text{W}/(\text{m}\cdot\text{K})$		R_{thCH}	25,0		K/kW	
在开关状态下温度 Temperature under switching conditions			$T_{vj\text{op}}$	-50	125	$^{\circ}\text{C}$	

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二极管，制动-斩波器 / Diode, Brake-Chopper
最大额定值 / Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	$T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = -50^{\circ}\text{C}$	V_{RRM}	6500 6300 5700	V
连续正向直流电流 Continuous DC forward current		I_F	200	A
正向重复峰值电流 Repetitive peak forward current	$t_P = 1 \text{ ms}$	I_{FRM}	400	A
I ² t-值 I ² t - value	$V_R = 0 \text{ V}, t_P = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$	I^2t	26,0	kA ² s
最大损耗功率 Maximum power dissipation	$T_{vj} = 125^{\circ}\text{C}$	P_{RQM}	600	kW
最小开通时间 Minimum turn-on time		$t_{on \text{ min}}$	10,0	μs

特征值 / Characteristic Values

				min.	typ.	max.	
正向电压 Forward voltage	$I_F = 200 \text{ A}, V_{GE} = 0 \text{ V}$ $I_F = 200 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	V_F	3,00	3,80 3,90	4,60 4,70	V V
反向恢复峰值电流 Peak reverse recovery current	$I_F = 200 \text{ A}, -di_F/dt = 700 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 3600 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	I_{RM}		270 330		A A
恢复电荷 Recovered charge	$I_F = 200 \text{ A}, -di_F/dt = 700 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 3600 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	Q_r		180 350		μC μC
反向恢复损耗 (每脉冲) Reverse recovery energy	$I_F = 200 \text{ A}, -di_F/dt = 700 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 3600 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	E_{rec}		220 550		mJ mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		R_{thJC}			63,0	K/kW
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个二极管 / per diode $\lambda_{\text{Paste}} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1 \text{ W}/(\text{m}\cdot\text{K})$		R_{thCH}		46,0		K/kW
在开关状态下温度 Temperature under switching conditions			$T_{vj \text{ op}}$	-50		125	$^{\circ}\text{C}$

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