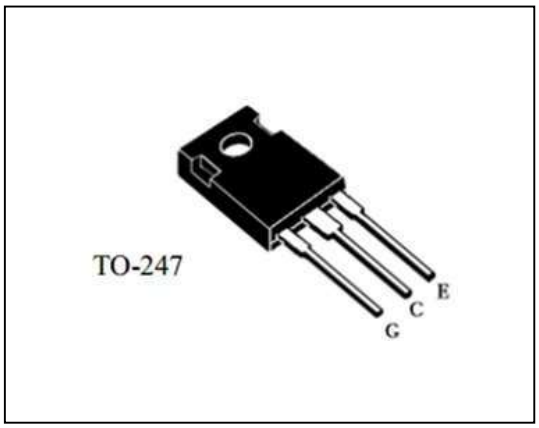
1200V 40A IGBT Discrete

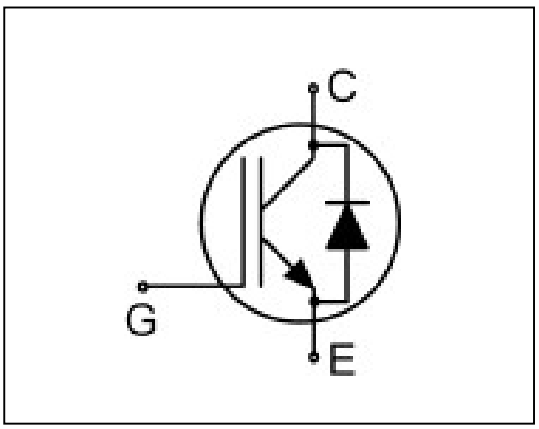
1200V 40A IGBT 单管

General Description / 概述

SOLIDPOWER IGBT Discrete provides low switching losses as well as high RBSOA capability. They are designed for the applications such as industrial UPS, charger, Energy storage, Three-level solar string inverter, welding etc.

索力德普 IGBT 功率单管具有低的开关损耗和良好的 RBSOA 能力。此设计适用于工业 UPS，充电桩，储能，光伏逆变器，焊机等应用。





Features：

- 1200V Trench Field Stop technology
- SiC SBD Freewheeling Diodes
- Low switching losses
- Low gate charge

产品特性：

- 1200V 沟槽栅+场截止技术
- SiC SBD 续流二极管
- 低开关损耗
- 低栅极电荷

Typical Applications：

- Industrial UPS
- Charger
- Energy storage
- Inverter
- Welding

典型应用：

- 工业UPS
- 充电桩
- 储能
- 逆变器
- 焊机

IGBT / IGBT

Maximum Rated Values / 最大额定值

Item	Symbol	Conditions	Value	Units
集电极－发射极电压 Collector-emitter voltage	V_{CES}	T_{vj}=25°C	1200	V
连续集电极直流电流 Continuous DC collector current	$I_{C\ nom}$	T_C=25°C, T_{vj}=175°C T_C=100°C, T_{vj}=175°C	80 40	A
最大脉冲集电极电流 Collector Current – pulse	I_{CM}		160	A
总功率损耗 Total power dissipation	P_{tot}	T_C=25°C, T_{vj}=175°C	568	W
栅极－发射极峰值电压 Maximum gate-emitter voltage	V_{GES}		±20	V

Characteristic Values / 特征值

Item	Symbol	Conditions		Min.	Typ.	Max.	Units
集电极－发射极饱和电压 Collector-emitter saturation voltage	$V_{CE\ (sat)}$	I_C=40A,V_{GE}=15V	T_{vj}=25°C T_{vj}=175°C	- -	1.8 2.4	2.2 -	V V
栅极阈值电压 Gate threshold voltage	$V_{GE(th)}$	I_C=0.25mA, V_{CE}=V_{GE}, T_{vj}=25°C		4.5	-	6.5	V
栅极电荷 Total gate charge	Q_G	V_{CC}=960V, I_C=40A, V_{GE}=15V , T_{vj}=25°C			165		nC
栅极-发射极电荷 Gate to emitter charge	Q_{GE}	V_{CC}=960V, I_C=40A, V_{GE}=15V , T_{vj}=25°C			46		nC
栅极-集电极电荷 Gate to collector charge	Q_{GC}	V_{CC}=960V, I_C=40A, V_{GE}=15V , T_{vj}=25°C			69		nC
内部栅极电阻 Internal gate resistor	R_{Gint}	T_{vj}=25°C			3.4		Ω
输入电容 Input capacitance	C_{ies}	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V			4604		pF
输出电容 Output capacitance	C_{oes}	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V			200		pF
反向传输电容 Reverse transfer capacitance	C_{res}	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V			49		pF
集电极-发射极截止电流 Collector-emitter cut-off current	I_{CES}	V_{CE}=1200V, V_{GE}=0V, T_{vj}=25°C				0.20	mA
栅极-发射极漏电流 Gate-emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V, T_{vj}=25°C				200	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	$t_{d\ (on)}$	I_C=40A, V_{CE}=600V V_{GE}=±15V R_{Gon}=12Ω R_{Goff}=12Ω Inductive Load	T_{vj}=25°C T_{vj}=175°C		56 50		ns ns
上升时间(电感负载) Rise time, inductive load	t_r		T_{vj}=25°C T_{vj}=175°C		98 98		ns ns
关断延迟时间(电感负载) Turn-off delay time, inductive load	$t_{d\ (off)}$		T_{vj}=25°C T_{vj}=175°C		208 252		ns ns
下降时间(电感负载) Fall time, inductive load	t_f		T_{vj}=25°C T_{vj}=175°C		176 322		ns ns
开通损耗能量(每脉冲) Turn-on energy loss per pulse	E_{on}		T_{vj}=25°C T_{vj}=175°C		2.10 2.24		mJ mJ
关断损耗能量(每脉冲） Turn-off energy loss per pulse	E_{off}		T_{vj}=25°C T_{vj}=175°C		2.28 3.48		mJ mJ
结－外壳热阻 Thermal resistance, junction to case	R_{thJC}	Per IGBT / 每个 IGBT			-	0.25	K/W
工作温度 Temperature under switching conditions	T_{vjop}			-55		150	°C

Diode / 二极管

Maximum Rated Values /最大额定值

Item	Symbol	Conditions	Value	Units
反向重复峰值电压 Peak repetitive reverse voltage	V_{RRM}	T_{vj}=25°C	1200	V
连续正向直流电流 Continuous DC forward current	I_F	T_C=150°C, T_{vj}=175°C	20	A
二极管正向不重复峰值电流（浪涌电流） Surge non repetitive forward current	I_{FRM}	t_p= 10 ms	160	A

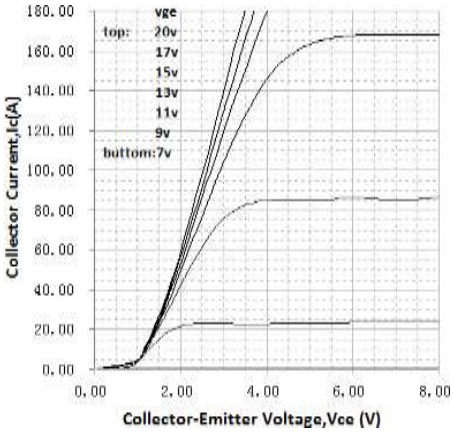
Characteristic Values / 特征值

Item	Symbol	Conditions		Min.	Typ.	Max.	Units
正向电压 Forward voltage	V_F	I_F=20A	T_{vj}=25°C T_{vj}=175°C		1.5 2.1	1.8 2.4	V V
结－外壳热阻 Thermal resistance, junction to case	R_{thJC}	Per diode / 每个二极管				0.55	K/W
工作温度 Temperature under switching conditions	T_{vjop}			-40		150	°C

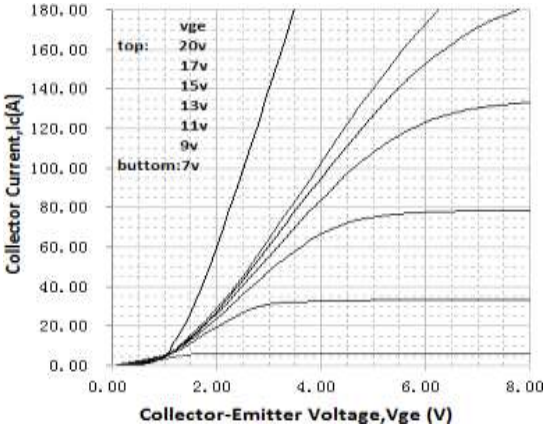
Discrete / 单管

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
储存温度 Storage temperature	T_{stg}		-55		150	°C
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T_L				300	°C

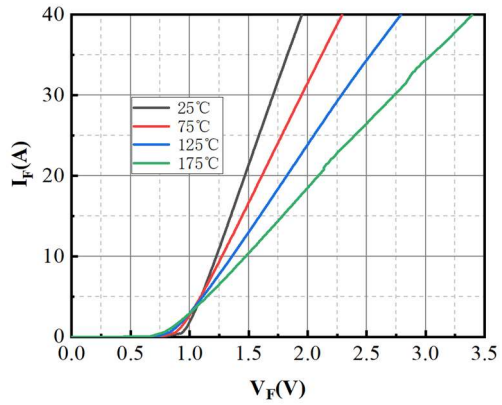
输出特性 IGBT
Output characteristic IGBT
$I_C=f(V_{CE})$, $T_{vj}=25°C$



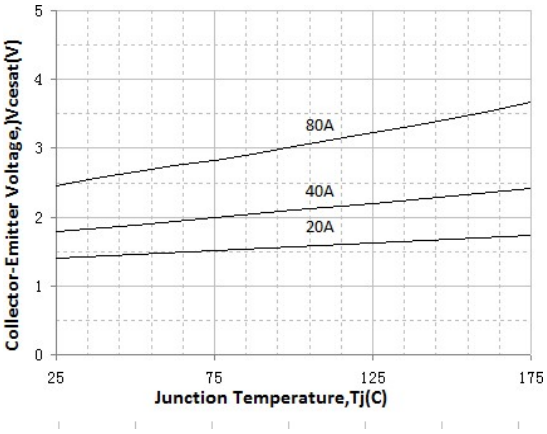
输出特性 IGBT
Output characteristic IGBT
$I_C=f(V_{CE})$, $T_{vj}=175°C$



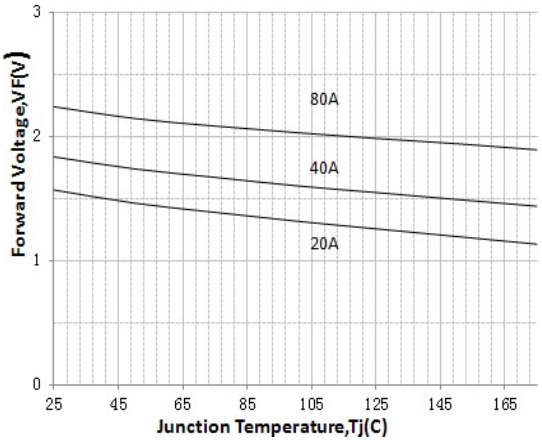
输出特性 FRD
Output characteristic FRD
$I_F=f(V_F)$



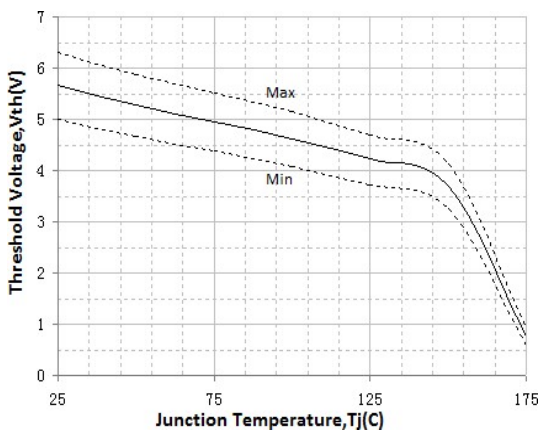
通态压降 IGBT
Collector-emitter saturation voltage IGBT
$V_{CE(sat)}=f(T_j)$



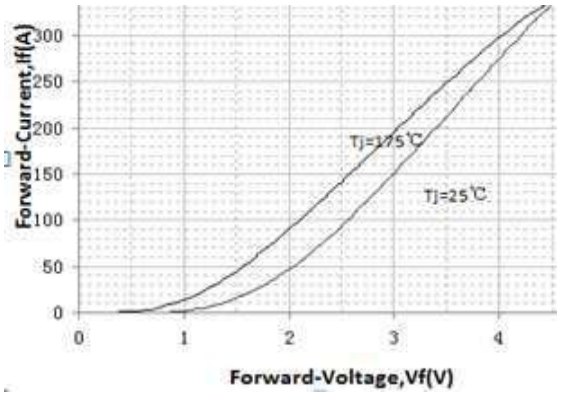
正向压降 FRD
Collector-emitter saturation voltage FRD
$V_F=f(T_j)$



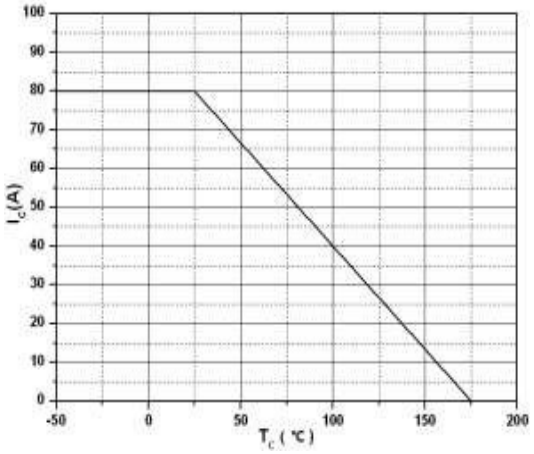
栅极阈值电压 IGBT
Gate-emitter threshold voltage IGBT
$V_{GE(th)}=f(T_j)$



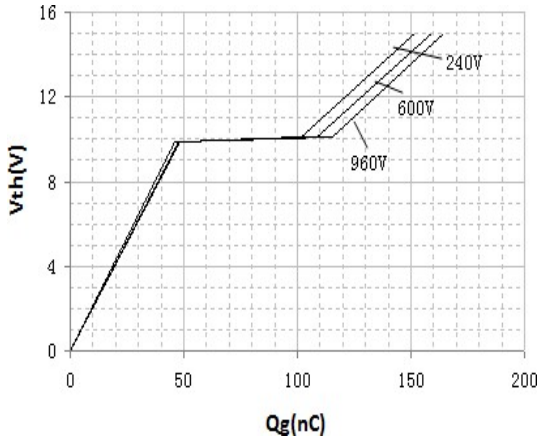
输出特性 FRD
Output characteristic FRD
$I_F=f(V_F)$



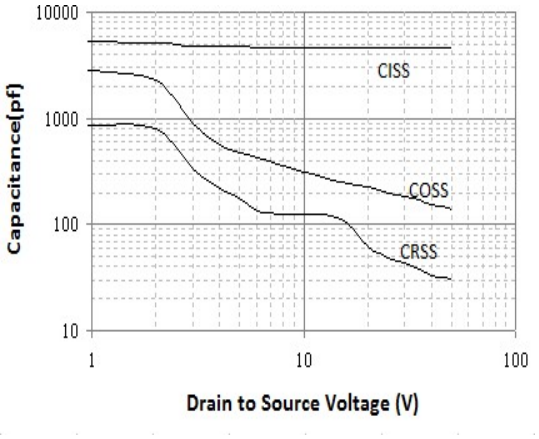
集电极电流 IGBT
Collector Current IGBT
$I_C=f(T_C)$
$V_{GE}\geq 15V$，$T_{vj}\leq 175°C$



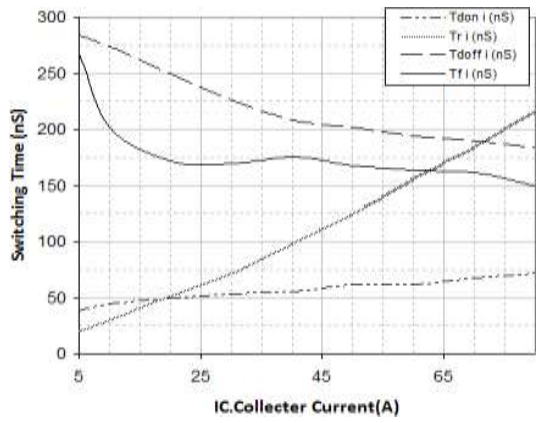
栅极电荷
Gate Charge Characteristics
$V_{GE(th)}=f(Q_g)$
$V_{GE}=15V$, $I_C=40A$



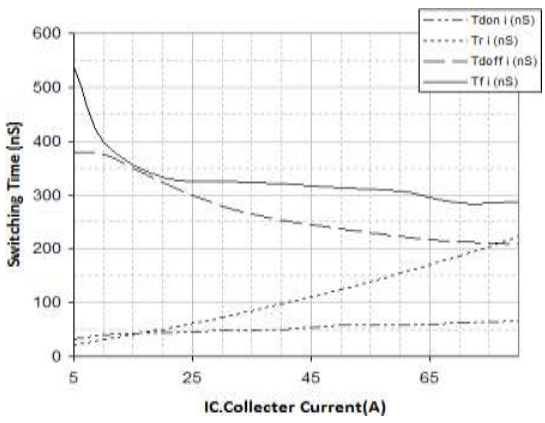
电容特性
Capacitance Characteristic
$V_{CE}=25V$, $V_{GE}=0V$, f=1MHZ



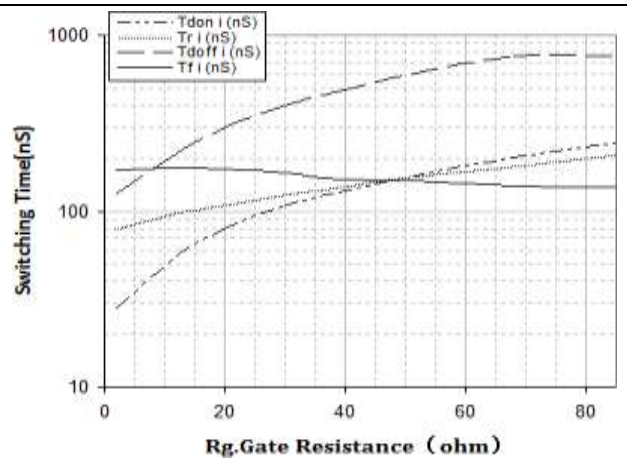
开关时间 IGBT
Switching Time IGBT
$t_s=f(I_C)$, $T_{vj}=25°C$



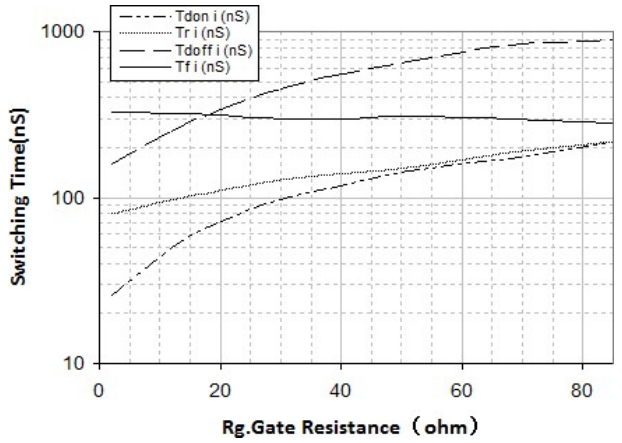
开关时间 IGBT
Switching Time IGBT
$t_s=f(I_C)$, $T_{vj}=175°C$



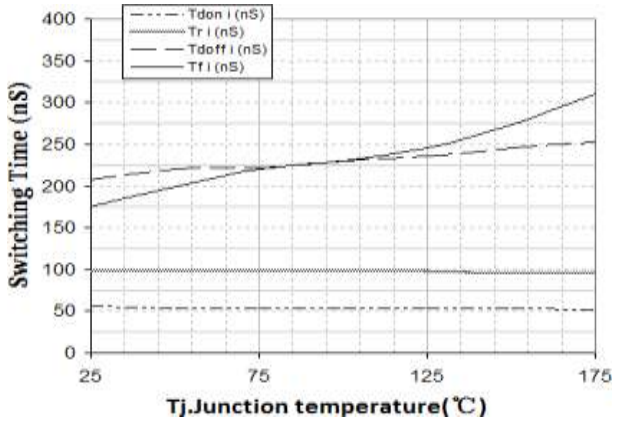
开关时间 IGBT
Switching Time IGBT
t_s=f (R_G), T_{vj}=25°C
V_{GE}=15V, V_{CE}=600V, I_C=40A



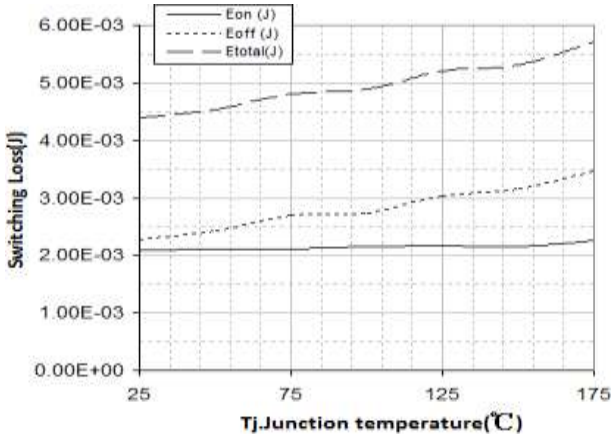
开关时间 IGBT
Switching Time IGBT
t_s=f (R_G), T_{vj}=175°C
V_{GE}=15V, V_{CE}=600V, I_C=40A



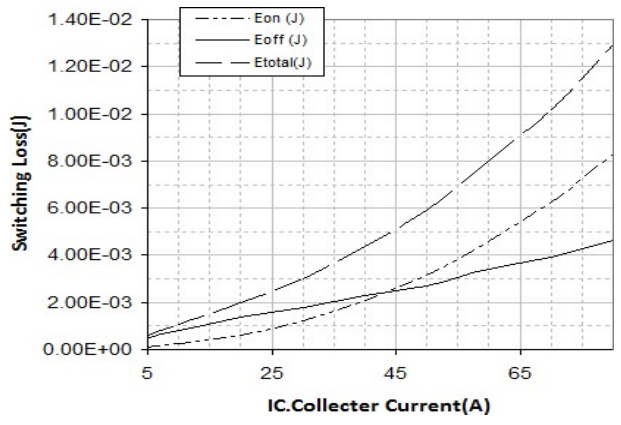
开关时间 IGBT
Switching Time IGBT
t_s=f (T_j)
V_{GE}=15V, V_{CE}=600V, R_G=12Ω, I_C=40A



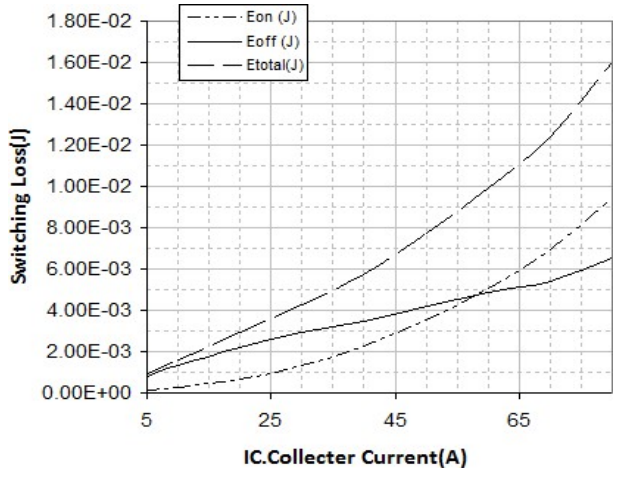
开关损耗 IGBT
Switching losses IGBT
E=f (T_j)
V_{GE}=15V, V_{CE}=600V, R_G=12Ω, I_C=40A



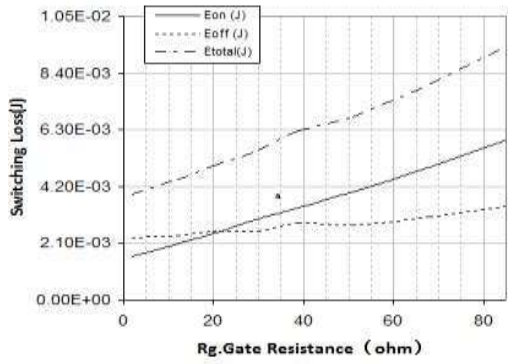
开关损耗 IGBT
Switching losses IGBT
E=f (I_C)
V_{GE}=15V, V_{CE}=600V, R_G=12Ω, T_{vj}=25°C



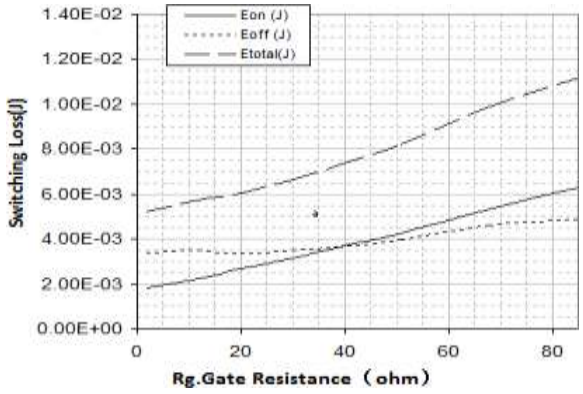
开关损耗 IGBT
Switching losses IGBT
E=f (I_C)
V_{GE}=15V, V_{CE}=600V, R_G=12Ω, T_{vj}=175°C



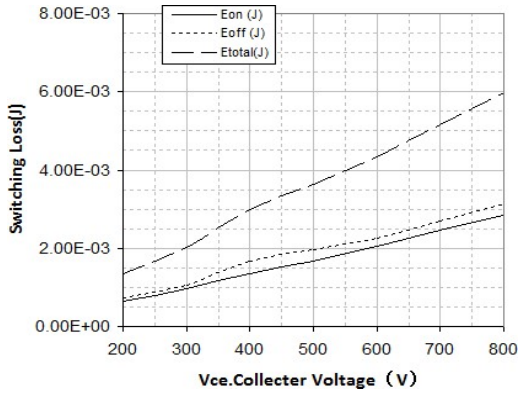
开关损耗 IGBT
Switching losses IGBT
E=f (R_G)
V_{GE}=15V, V_{CE}=600V, I_C=40A, T_{vj}=25°C



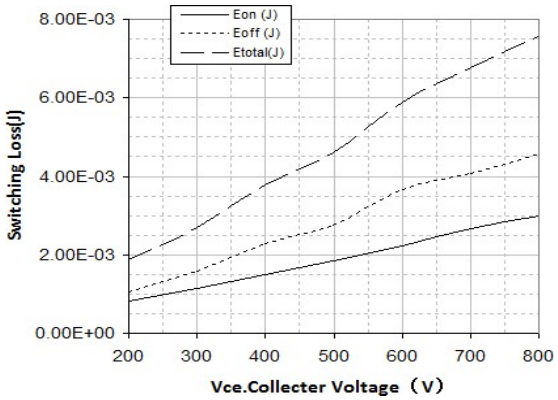
开关损耗 IGBT
Switching losses IGBT
E=f (R_G)
V_{GE}=15V, V_{CE}=600V, I_C=40A, T_{vj}=175°C



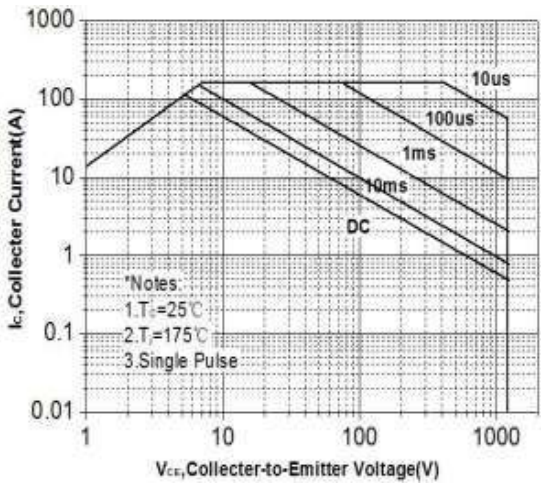
开关损耗 IGBT
Switching losses IGBT
E=f (V_{CE}), T_{vj}=25°C
V_{GE}=15V, R_G=12Ω, I_C=40A



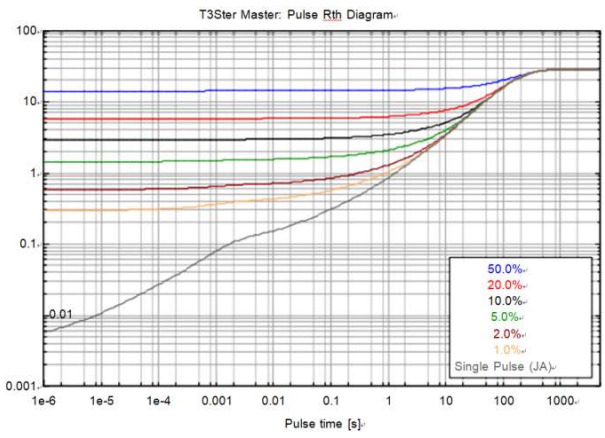
开关损耗 IGBT
Switching losses IGBT
E=f (V_{CE}), T_{vj}=175°C
V_{GE}=15V, R_G=12Ω, I_C=40A



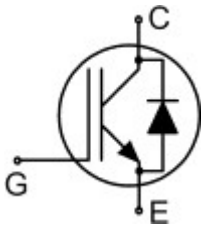
正向安全工作区
Forward Bias SOA
T_C=25°C , V_{GE}=15V, T_{vj}≤175°C



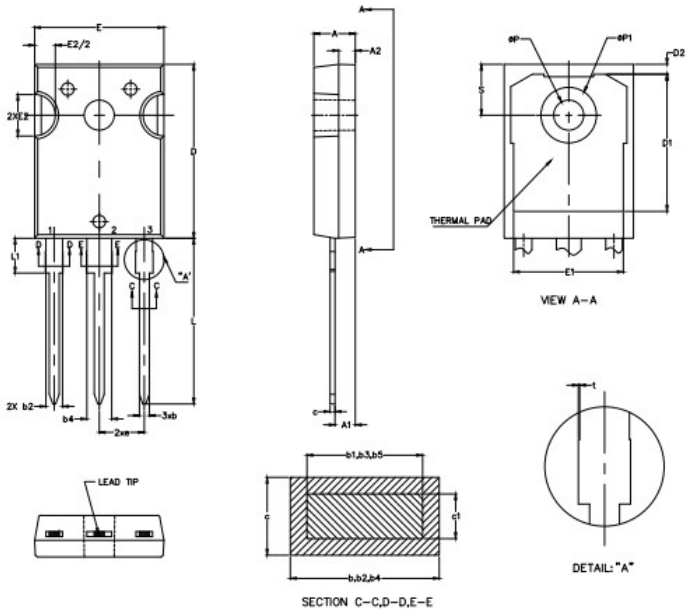
瞬态热阻抗 IGBT
Transient thermal impedance IGBT
Z_{thJA}=f (t)



Circuit diagram headline / 接线图



Package outlines / 封装尺寸



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
b1	1.15	1.22	0.045	0.048
b2	1.96	2.06	0.077	0.081
b3	1.95	2.02	0.077	0.080
b4	2.96	3.06	0.117	0.120
b5	2.95	3.02	0.116	0.119
c	0.59	0.66	0.023	0.026
c1	0.58	0.62	0.023	0.024
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
E	15.75	15.90	0.620	0.626
E1	13.26	——	0.552	——
E2	4.90	5.10	0.193	0.201
e	5.44BSC		0.214BSC	
L	19.80	20.10	0.780	0.791
L1	——	4.30	——	0.169
øP	3.50	3.70	0.138	0.146
øP1	——	7.40	——	0.291
S	6.05	6.25	0.238	0.246
t	0.00	0.15	0.000	0.006