

40GU65F2

主要参数 Main Characteristics

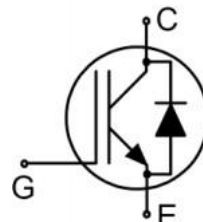
I_C	40A
V_{ces}	650 V
$V_{cesat-typ}$	1.8V

用途

- 光伏逆变器
- UPS 电源
- 电焊机
- 中高频率逆变器

Applications

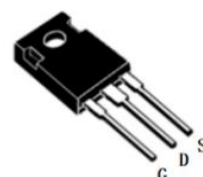
- Solar Converters
- Uninterrupted Power Supply
- Welding Converters
- Mid to High Range Switching
Frequency Converters



TO-247

产品特性

- 650V, 40A
- $V_{CE(sat)(typ.)} = 1.8V @ V_{GE} = 15V, I_C = 40A$
- Maximum Junction Temperature 175°C
- Pb-free Lead Plating; RoHS Compliant



产品中有毒有害物质或元素的名称及含量

部件名称 含量要求	有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
	≤0.1%	≤0.1%	≤0.01%	≤0.1%	≤0.1%	≤0.1%
引线框	○	○	○	○	○	○
塑封树脂	○	○	○	○	○	○
管 芯	○	○	○	○	○	○
内引线	○	○	○	○	○	○
焊 料	×	○	○	○	○	○
说 明	○：表示该元素的含量在 SJ/T11363-2006 标准的限量要求以下。 ×：表示该元素的含量超出 SJ/T11363-2006 标准的限量要求。 目前产品的焊料中含有铅 (Pb) 成分，但属于欧盟 RoHS 指令豁免范围。					

绝对最大额定值 **Absolute Ratings** ($T_c=25^{\circ}\text{C}$)

项 目 Parameter	符 号 Symbol	数 值 Value	单位 Unit
最高集电极—发射极直流电压 Collector-Emmitter Voltage	V_{ces}	650	V
最高栅极发射极电压 Gate-Emmitter Voltage	V_{GES}	± 30	V
连续集电极电流 Collector Current-continuous	I_C $T_C=25^{\circ}\text{C}$	80	A
	I_C $T_C=100^{\circ}\text{C}$	40	A
最大脉冲集电极极电流（注 1） Collector Current – pulse（note 1）	I_{CM}	120	A
二极管正向电流 Diode Continuous Forward Current	I_F $T_C=100^{\circ}\text{C}$	40	A
二极管最大正向电流 Diode Maximum Forward Current (Note 1)	I_{FM}	120	A
短路时间 Short Circuit Withstand Time ($T_J \leq 150^{\circ}\text{C}$)	t_{sc}	5	μs
耗散功率 Power Dissipation	P_D $T_C=25^{\circ}\text{C}$	246	W
	P_D $T_C=100^{\circ}\text{C}$	123	W
最高结温 Operating Junction Temperature	T_J	-45~175	$^{\circ}\text{C}$
存储温度 Storage Temperature Range	T_{STG}	-55~150	$^{\circ}\text{C}$

热特性 **Electrical Characteristics**

项 目 Parameter	符 号 Symbol	数 值 Value	单位 Unit
IGBT结到管壳的热阻 Thermal Resistance, Junction to case for IGBT	$R_{th\ j-c}$	0.61	$^{\circ}\text{C}/\text{W}$
FRD结到管壳的热阻 Thermal Resistance, Junction to case for Diode	$R_{th\ j-c}$	1.15	$^{\circ}\text{C}/\text{W}$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th\ j-a}$	40	$^{\circ}\text{C}/\text{W}$

IGBT电特性 Electrical Characteristics of IGBT($T_c=25^\circ\text{C}$ unless otherwise noted)

项 目 Parameter	符 号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
集电极-发射极击穿电压 Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=250\mu A$	600	-	-	V
零栅压下集电极漏电流 Collector-Emitter Leakage Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$	-	-	100	μA
正向栅极体漏电流 Gate Leakage Current	I_{GES}	$V_{GE}=\pm 20V, V_{CE}=0V$	-	-	± 100	nA
阈值电压 Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=250\mu A$	4.5	-	6.3	V
饱和压降 Collector-Emmitter saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=40A$	-	1.8	2.35	V
栅极电荷总量 Total Gate Charge	Q_g	$V_{CC}=480V$ $V_{GE}=15V$ $I_C=40A$	-	82		nC
栅极-反射极 Gate to emitter charge	Q_{ge}		-	14.3		nC
栅极-集电极 Gate to collector charge	Q_{gc}		-	45		nC
开启延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{CC}=400V$ $V_{GE}=15V$ $I_C=40A$ $R_G=15\Omega$ Inductive Load $T_c=25^\circ\text{C}$	-	36	-	ns
上升时间 Turn-On rise time	t_r		-	66	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	137	-	ns
下降时间 Turn-Off Fall time	t_f		-	35	-	ns
开通损耗 Turn-On energy	E_{on}		-	1.4	-	mJ
关断损耗 Turn-off energy	E_{off}		-	0.5	-	mJ
总开关损耗 Total switching energy	E_{tot}		-	1.9	-	mJ
输入电容 Input capacitance	C_{ies}	$V_{CE}=25V$ $V_{GE}=0V$ $f=1\text{MHz}$	-	2020	-	pF
输出电容 Output capacitance	C_{oes}		-	101	-	pF
反向传输电容 Reverse transfer capacitance	C_{res}		-	36	-	pF

二极管电特性 Electrical Characteristics of Diode ($T_c=25^\circ\text{C}$ unless otherwise noted)

正向压降 Diode Forward Voltage	V_F	$I_F=40A$	-	1.8	2.45	V
反向恢复时间 Diode Reverse Recovery Time	t_{rr}	$V_{CE}=400V$ $I_F=40A$ $R_g=30\Omega$	-	180		ns
反向恢复电流 Diode peak Reverse Recovery Current	I_{rr}		-	17.5		A
反向恢复电荷 Diode Reverse Recovery Charge	Q_{rr}		-	1106		nC

Note1: Repetitive rating, pulse width limited by maximum junction temperature

特征曲线 ELECTRICAL CHARACTERISTICS (curves)

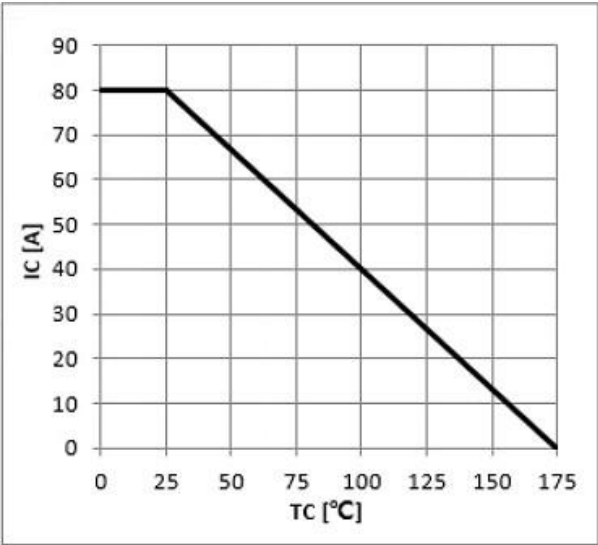


Figure 1: Maximum DC Collector Current VS. case temperature

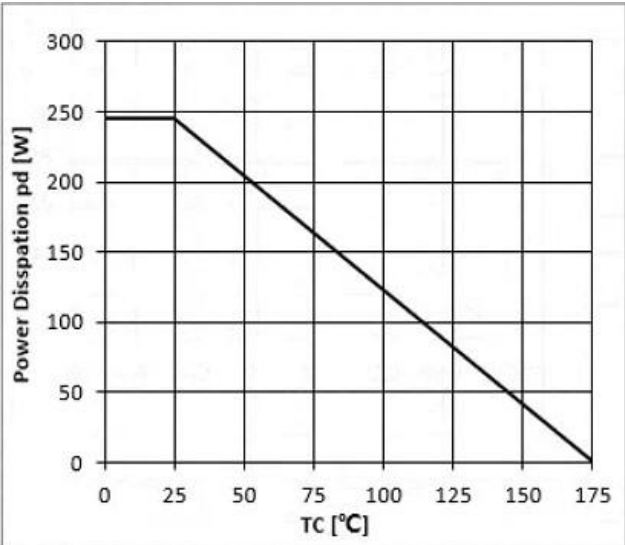


Figure 2: Power Dissipation VS. Case Temperature

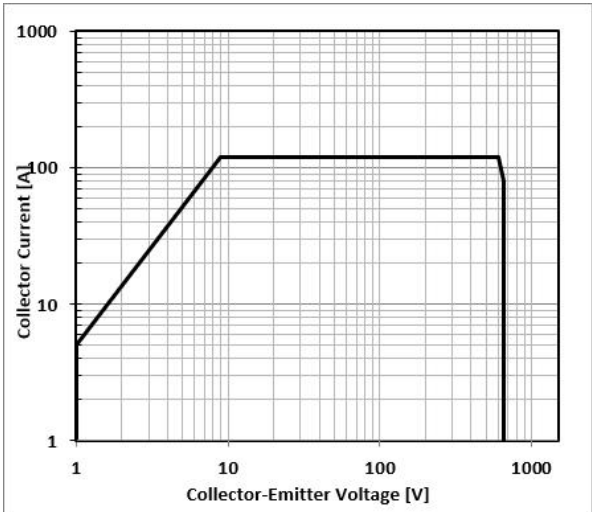


Figure 3: Reverse Bias SOA, TJ=125°C, VGE=15V

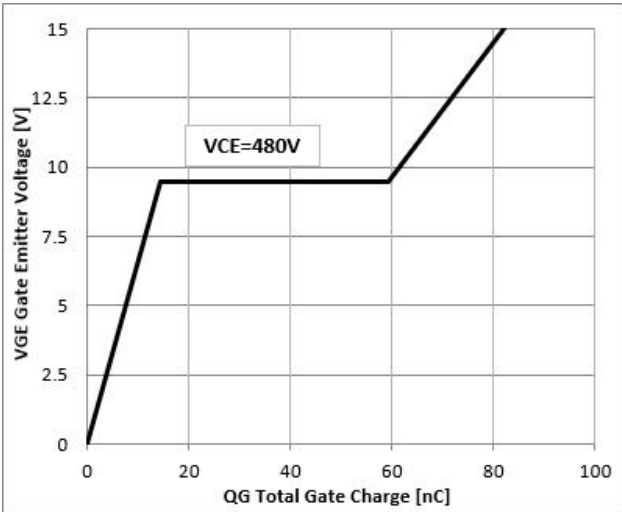


Figure 4: Typical Gate charge VS. VGE, IC=40A

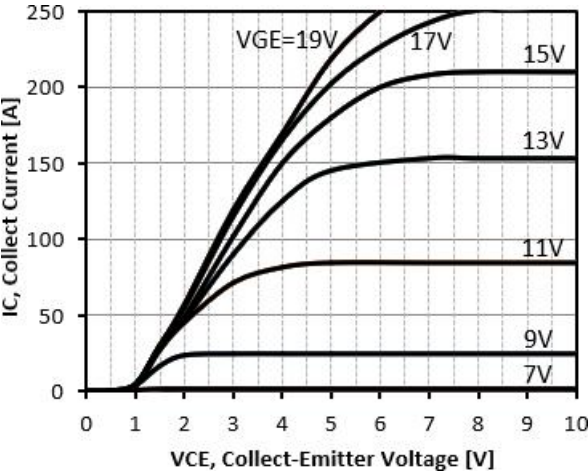


Figure 5: Typical IGBT Output characteristics,
TC=25°C; tp=300us

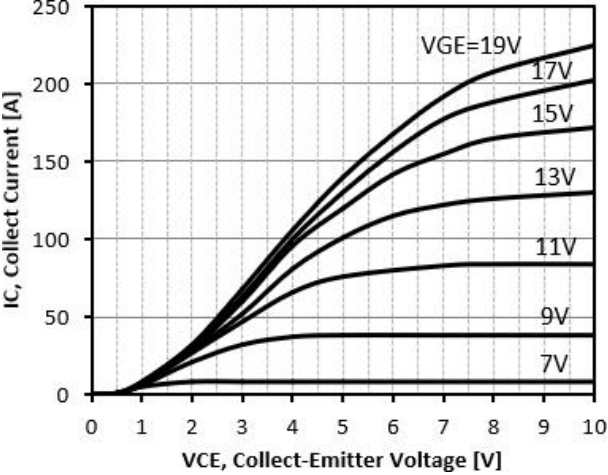


Figure 6: Typical IGBT Output characteristics,
TC=150°C; tp=300us

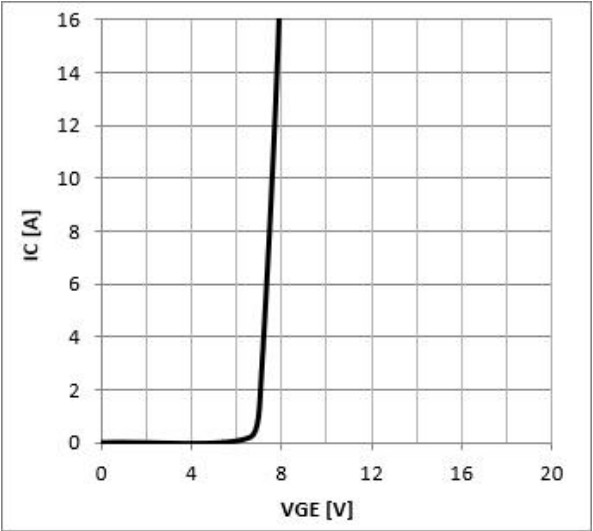


Figure 7: Typical Gate Threshold Voltage

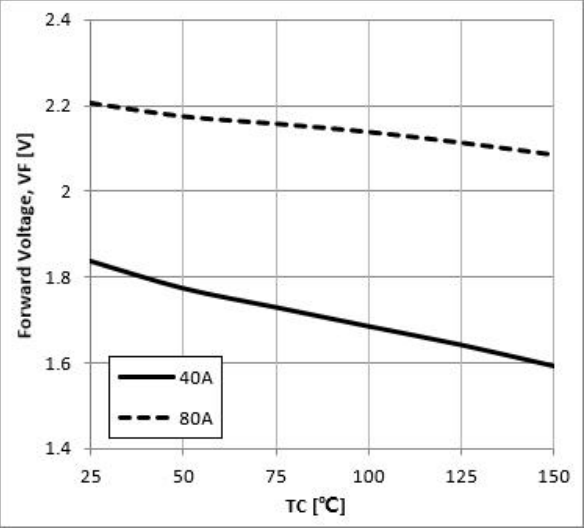


Figure 8: Typical Forward Voltage vs IF

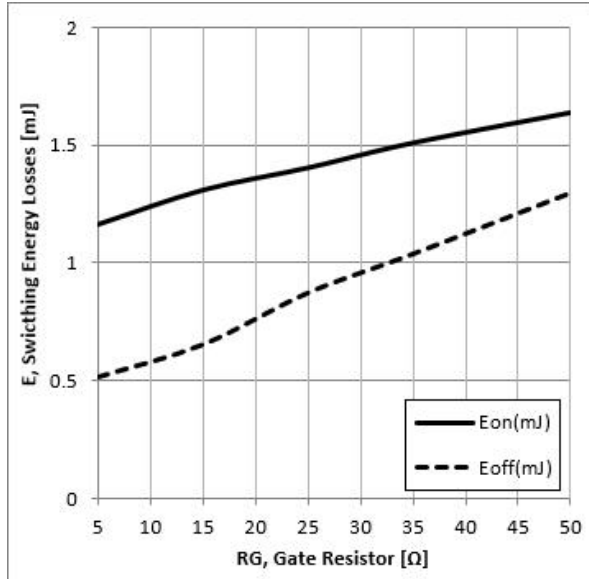


Figure 9: Typical Energy Loss VS. RG, TC=25°C,
L=100uH, VCE=400V, VGE=15V, IC=40A

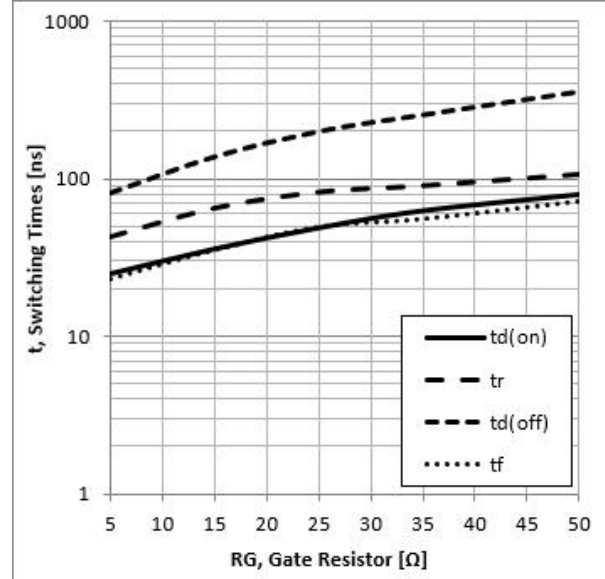


Figure 10: Typical Switching Time VS. RG, TC=25°C,
L=100uH, VCE=400V, VGE=15V, IC=40A

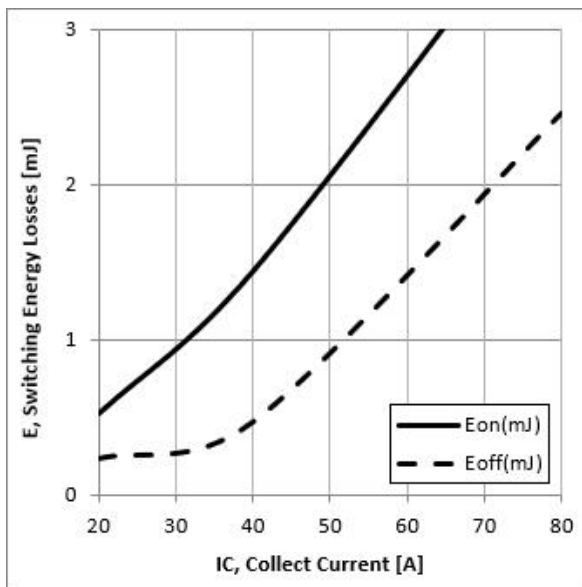


Figure 11: Typical Energy Loss VS. IC, TC=25°C,
L=100uH, VCE=400V, VGE=15V, RG=15Ω

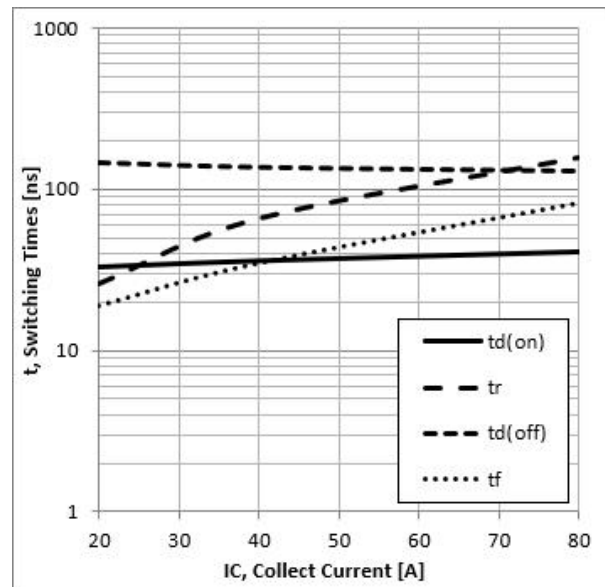


Figure 12: Typical Switching Time VS. IC, TC=25°C,
L=100uH, VCE=400V, VGE=15V, RG=15Ω

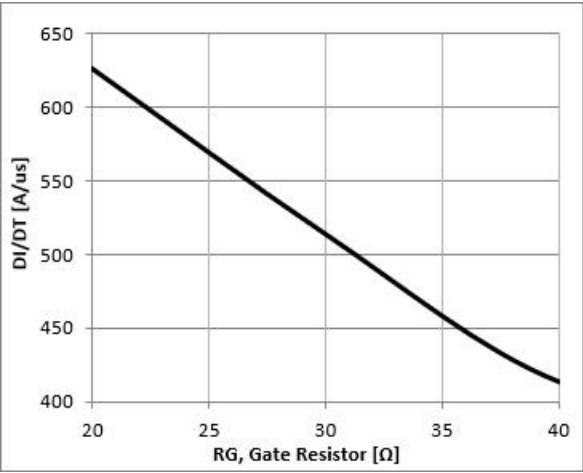


Figure 13: Typical Diode DI/DT VS. RG, TC=25°C
VCC=400V, VGE=15V, IF=40A

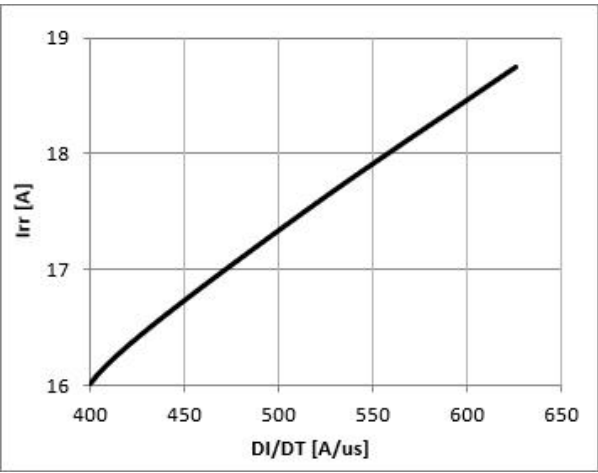


Figure 14: Typical Diode Irr VS. DI/DT, TC=25°C
VCC=400V, VGE=15V, IF=40A

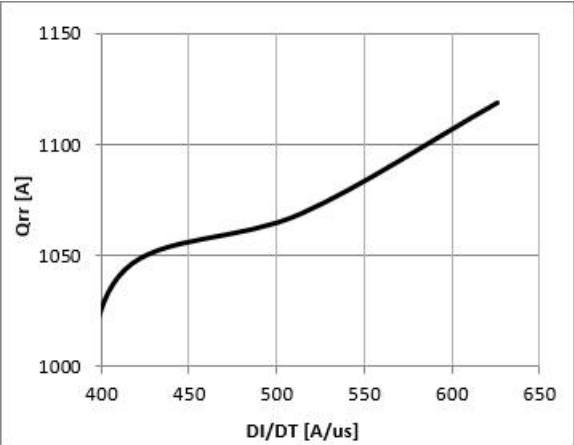


Figure 15: Typical Diode Qrr VS. DI/DT, TC=25°C
VCC=400V, VGE=15V, IF=40A

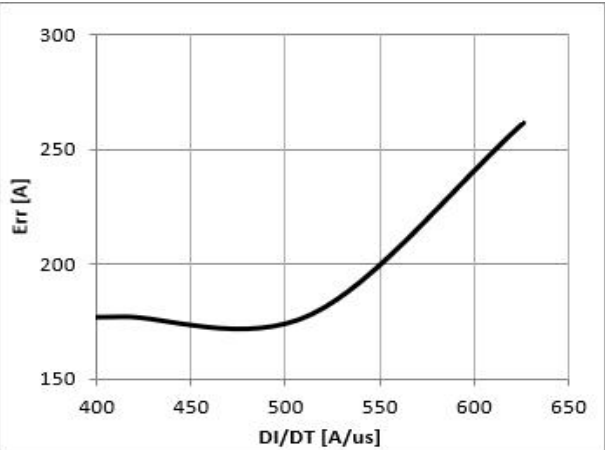


Figure 16: Typical Diode Err VS. DI/DT, TC=25°C
VCC=400V, VGE=15V, IF=40A

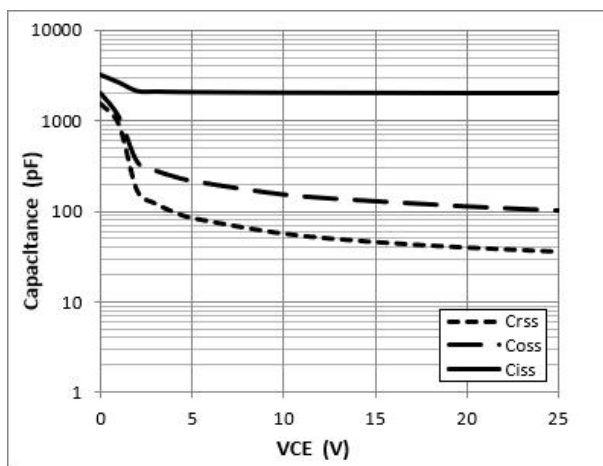


Figure 17: Typical Capacitance VS. VCE,
VGE=0V, f=1MHz

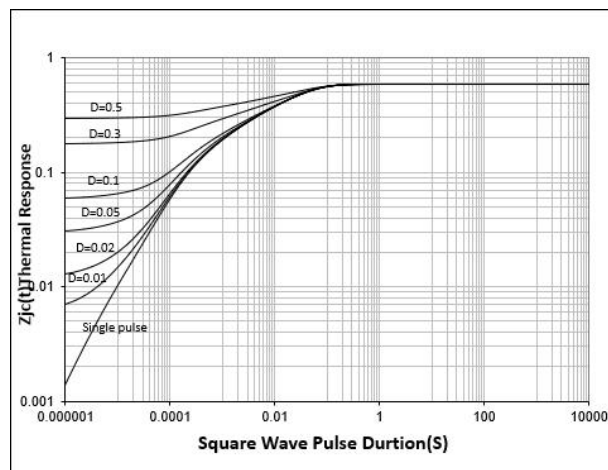


Figure 18: Normalized transient thermal impedance
junction-to-case

外形尺寸 PACKAGE MECHANICAL DATA

TO-247

