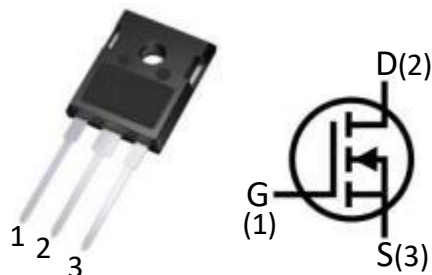


1200V 40mΩ 碳化硅功率MOSFET, TO-247-3L
1200V 40mΩ Silicon Carbide Power MOSFET, TO-247-3L

特点 Features

- 高阻断电压，低导通电阻
High Blocking Voltage with Low On-Resistance
- 高开关速度，低寄生电容
High Speed Switching with Low Capacitances
- 易于并联，驱动简单
Easy to Parallel and Simple to Drive
- 抗门锁效应
Resistant to Latch-Up
- 无卤素添加，符合RoHS标准
Halogen Free, RoHS Compliant



应用 Applications

- 电动汽车充电桩
EV Charging Station
- PFC及DC/DC转换
Power Factor Correction or DC/DC Converters
- 光伏逆变器
Solar Inverters
- 电机驱动系统
Motor Drives
- 开关模式电源 (SMPS)
Switch Mode Power Supplys

碳化硅功率MOSFET/ SiC Power MOSFET

最大额定值/ Maximum Rated Values ($T_c=25^{\circ}\text{C}$ unless otherwise noted)

参数 Parameter	符号 Symbol	条件 Condition	数值 Value	单位 Unit
漏极-源极电压 Drain-Source Voltage	V_{DSmax}	$V_{GS}=0V, I_D=100\mu A$	1200	V
栅极-源极电压 Gate-Source Voltage	V_{GSmax}	Absolute maximum values	-10/+22	V
栅极-源极电压 Gate-Source Voltage	V_{GSop}	Recommended operational values	-5/+18	V
连续漏极电流 Continuous Drain Current	I_D	$V_{GS}=18V, T_c=25^{\circ}\text{C}$	79	A
		$V_{GS}=18V, T_c=100^{\circ}\text{C}$	50	
漏极脉冲电流 Pulsed Drain Current	$I_{D(pulse)}$	Pulse width t_p limited by T_{Jmax}	180	A
耗散功率 Power Dissipation	P_D	$T_c=25^{\circ}\text{C}, T_J=150^{\circ}\text{C}$	357	W
工作结温 Operating Junction Temperature	$T_{vj, op}$		-55~150	$^{\circ}\text{C}$
存储温度范围 Storage Temperature Range	T_{stg}		-55~150	$^{\circ}\text{C}$

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

参数 Parameter	符号 Symbol	条件 Condition		数值 Value			单位 Unit
				Min	Typ.	Max	
漏极-源极阻断电压 Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=100\mu A$		1200			V
栅极阈值电压 Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=10mA$	$T_{vj}=25^{\circ}\text{C}$	2	2.9	4	V
			$T_{vj}=150^{\circ}\text{C}$		2.1		
零栅压漏极电流 Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=1200V, V_{GS}=0V$			1	100	μA
栅极-源极漏电流 Gate-Source Leakage Current	I_{GSS}	$V_{GS}=18V, V_{DS}=0V$				250	nA
漏极-源极导通电阻 Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=18V, I_D=40A$	$T_{vj}=25^{\circ}\text{C}$		43	53	m Ω
			$T_{vj}=150^{\circ}\text{C}$		57		
跨导 Transconductance	g_{fs}	$V_{DS}=20V, I_{DS}=40A$	$T_{vj}=25^{\circ}\text{C}$		21.2		S
			$T_{vj}=150^{\circ}\text{C}$		20.4		
输入电容 Input Capacitance	C_{iss}	$V_{GS}=0V$ $V_{DS}=1000V$ $f=100KHz$ $V_{AC}=25mV$			3360		pF
输出电容 Output Capacitance	C_{oss}				140		
反向传输电容 Reverse Transfer Capacitance	C_{rss}				12		
输出电容存储能量 C_{oss} Stored Energy	E_{oss}				138		
单脉冲雪崩能量 Avalanche Energy, Single Pluse	E_{AS}	$I_D=40A, V_{DD}=50V$			2		J
开通能量 Turn-On Switching Energy	E_{ON}	$V_{DS}=800V, V_{GS}=-5/18V$ $I_D=40A, R_{G(ext)}=2.5\Omega,$ $T_J=25^{\circ}\text{C}, L=150\mu H$			2		mJ
关断能量 Turn Off Switching Energy	E_{OFF}				0.3		
开通延迟时间 Turn-On Delay Time	$t_{d(on)}$	$V_{DS}=800V, V_{GS}=-5/18V$ $I_D=40A, R_{G(ext)}=2.5\Omega,$ $T_J=25^{\circ}\text{C}, L=150\mu H$ Timing relative to V_{DS}			18		ns
上升时间 Rise Time	t_r				67		
关断延迟时间 Turn-Off Delay Time	$t_{d(off)}$				22		
下降时间 Fall Time	t_f				13		
栅源电荷 Gate to Source Charge	Q_{gs}	$V_{DS}=800V, V_{GS}=-5/18V$ $I_D=40A$			47		nC
栅漏电荷 Gate to Drain Charge	Q_{gd}				39		
栅极总电荷 Total Gate Charge	Q_g				136		



体二极管特性 Body Diode Characteristics (T_{vj}=25°C unless otherwise noted)

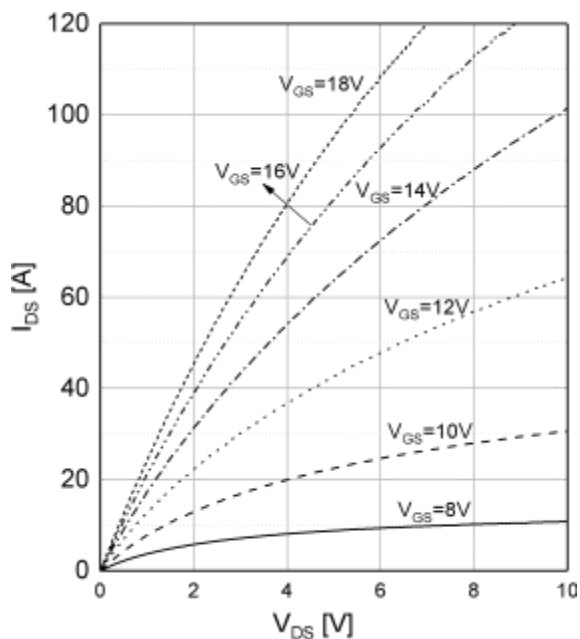
参数 Parameter	符号 Symbol	条件 Condition		数值 Value			单位 Unit
				Min	Typ.	Max	
二极管正向电压 Diode Forward Voltage	V _{SD}	V _{GS} =-5V, I _{SD} =20A	T _{vj} =25°C		5.1		V
			T _{vj} =150°C		4.7		
二极管连续正向电流 Continuous Diode Forward Current	I _S	V _{GS} =-5V, T _C =25°C				58	A
二极管脉冲电流 Diode Pulse Current	I _{S(pulse)}	V _{GS} =-5V, Pulse width t _p limited by T _{jmax}				180	A
反向恢复时间 Reverse Recovery Time	t _{rr}	V _{GS} =-5V, I _{SD} =40A T _J =25°C, V _R =800V dif/dt=1210A/μs			52		ns
反向恢复电荷 Reverse Recovery Charge	Q _{rr}				380		nC
反向恢复峰值电流 Peak Reverse Recovery Current	I _{rrm}				20		A

热特性 Thermal Characteristics

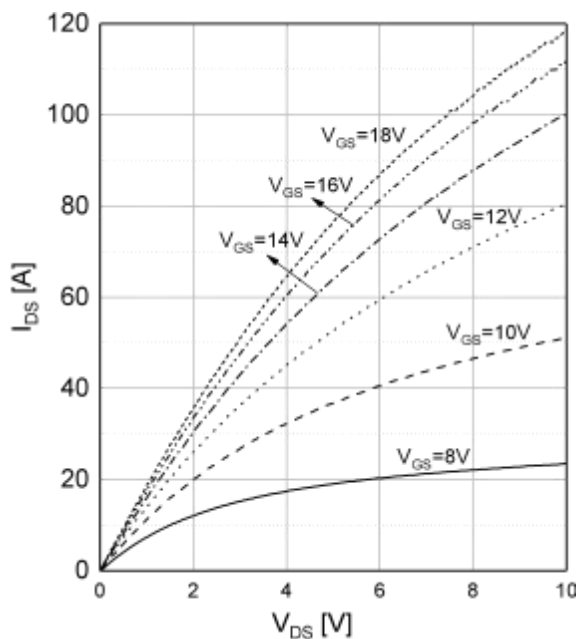
参数 Parameter	符号 Symbol	条件 Condition	数值 Value			单位 Unit
			Min	Typ.	Max	
结-壳热阻 Thermal Resistance: Junction to Case	R _{th(j-c)}			0.35	0.47	°C/W

输出特性
Output Characteristics

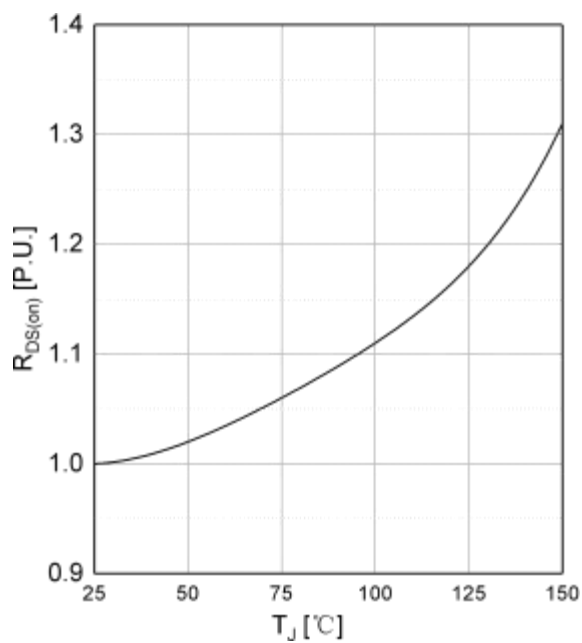
$$I_{DS} = f(V_{DS}), T_J = 25^\circ\text{C}$$


输出特性
Output Characteristics

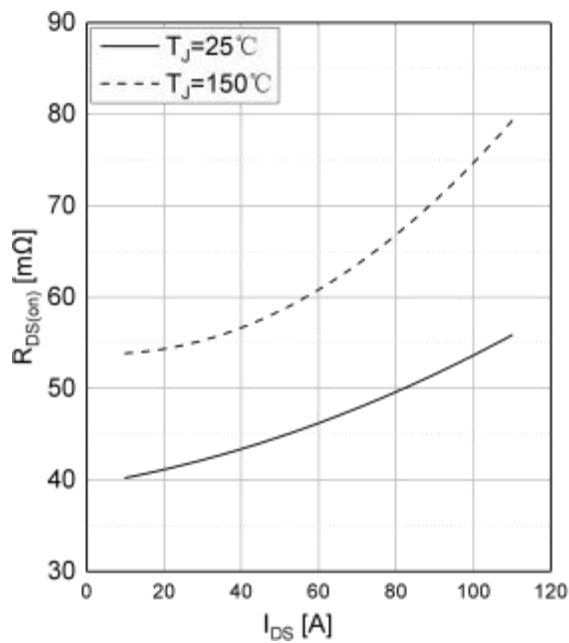
$$I_{DS} = f(V_{DS}), T_J = 150^\circ\text{C}$$


标准化导通电阻
Normalized On-Resistance

$$R_{DS(on)} = f(T_J), I_{DS} = 40\text{A}, V_{GS} = 18\text{V}$$


导通电阻
On-Resistance

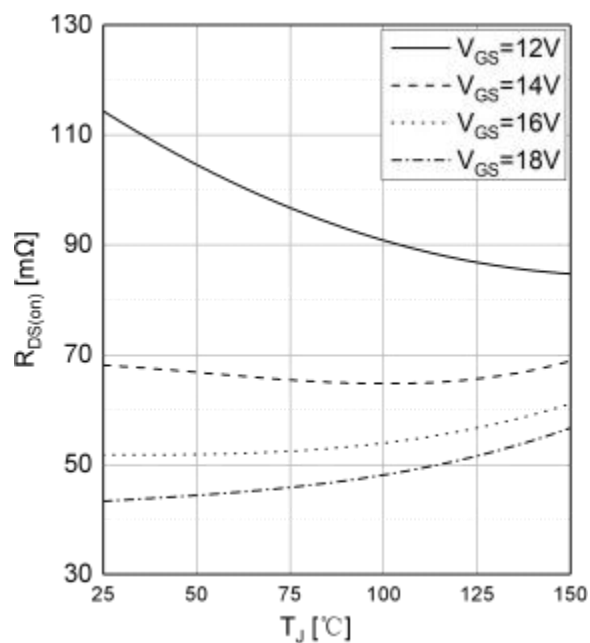
$$R_{DS(on)} = f(I_{DS}), V_{GS} = 18\text{V}$$



导通电阻

On-Resistance

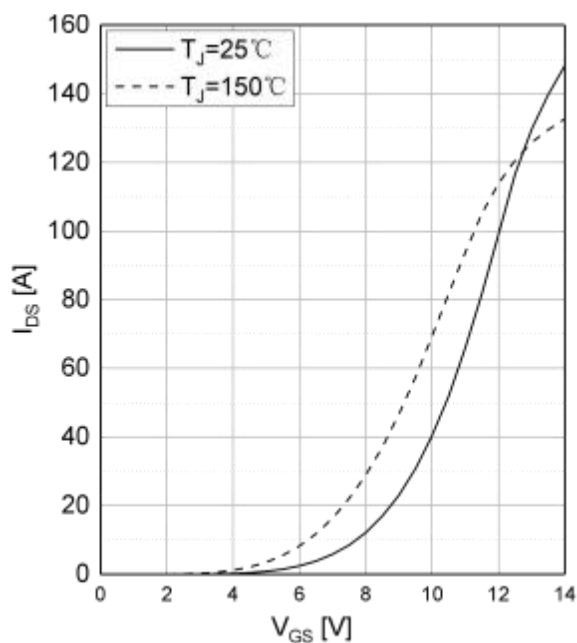
$$R_{DS(on)} = f(T_J), I_{DS} = 40A$$



转移特性

Transfer Characteristics

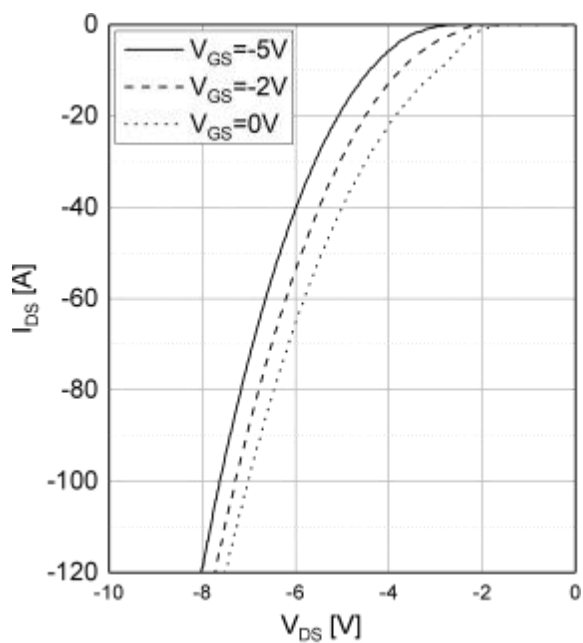
$$I_{DS} = f(V_{GS}), V_{DS} = 20V$$



体二极管特性

Body Diode Characteristics

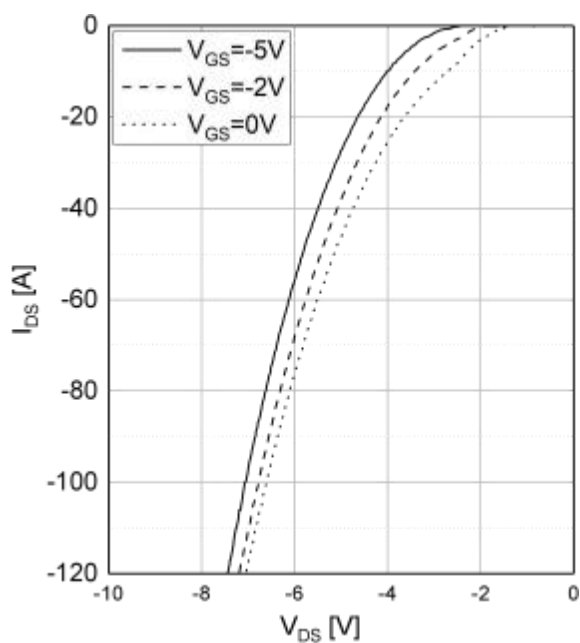
$$I_{DS} = f(V_{DS}), T_J = 25^\circ C$$



体二极管特性

Body Diode Characteristics

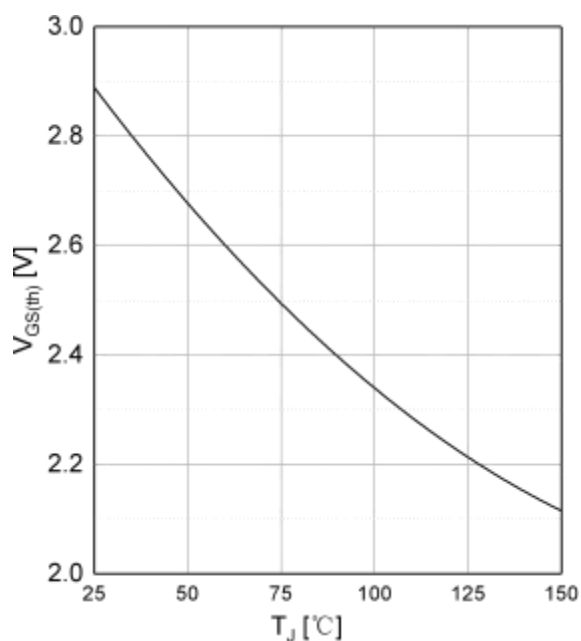
$$I_{DS} = f(V_{DS}), T_J = 150^\circ C$$



阈值电压

Threshold Voltage

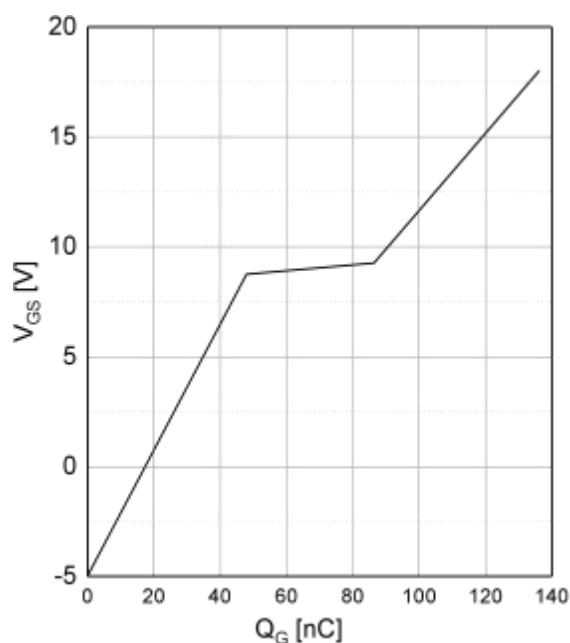
$V_{GS(th)} = f(T_J)$, $V_{GS} = V_{DS}$, $I_{DS} = 10\text{mA}$



栅极电荷特性

Gate Charge Characteristics

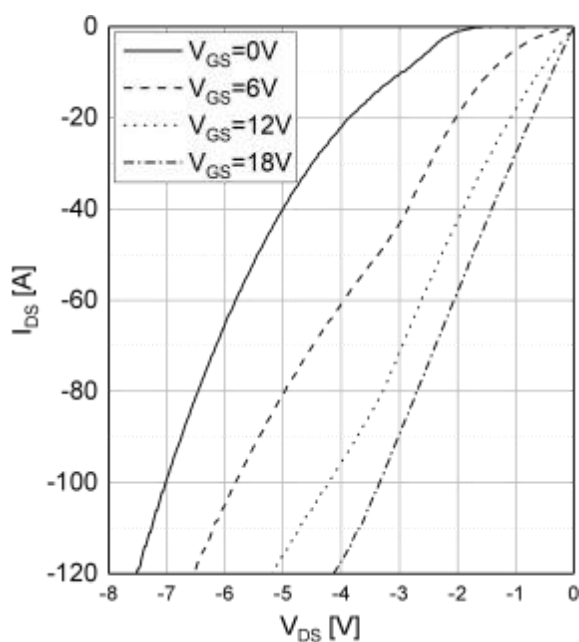
$V_{GS} = f(Q_G)$, $I_{DS} = 40\text{A}$, $I_{GS} = 50\text{mA}$, $V_{DS} = 800\text{V}$, $T_J = 25^\circ\text{C}$



第三象限特性

3rd Quadrant Characteristics

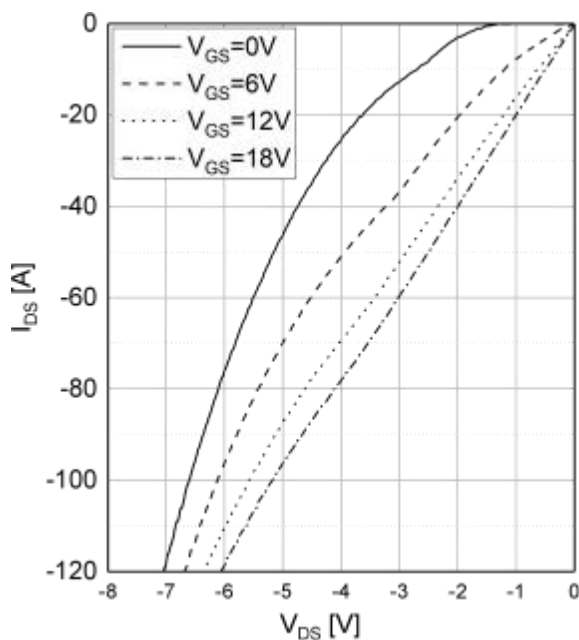
$I_{DS} = f(V_{DS})$, $T_J = 25^\circ\text{C}$



第三象限特性

3rd Quadrant Characteristics

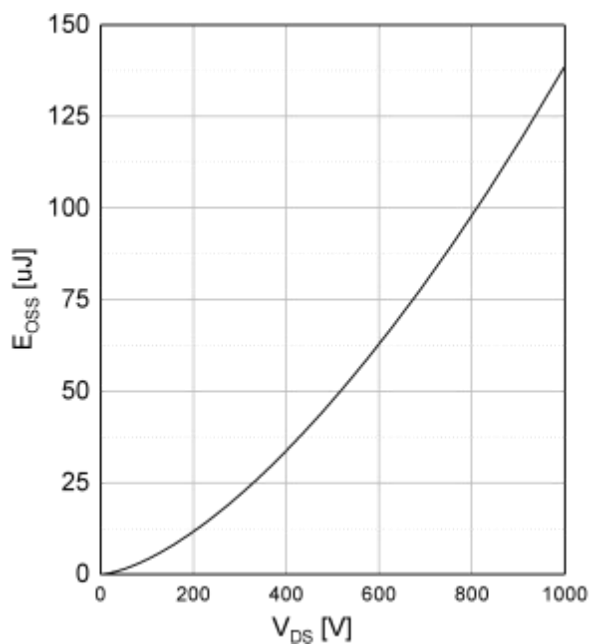
$I_{DS} = f(V_{DS})$, $T_J = 150^\circ\text{C}$



输出电容存储能量

Output Capacitor Stored Energy

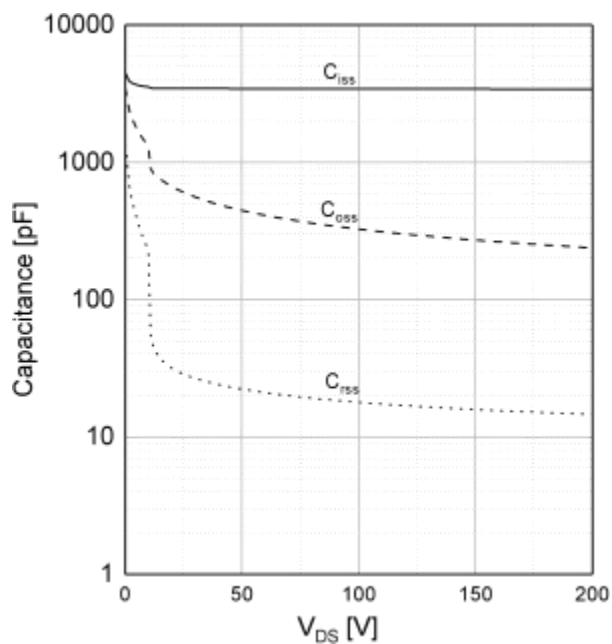
$$E_{OSS} = f(V_{DS})$$



电容

Capacitances

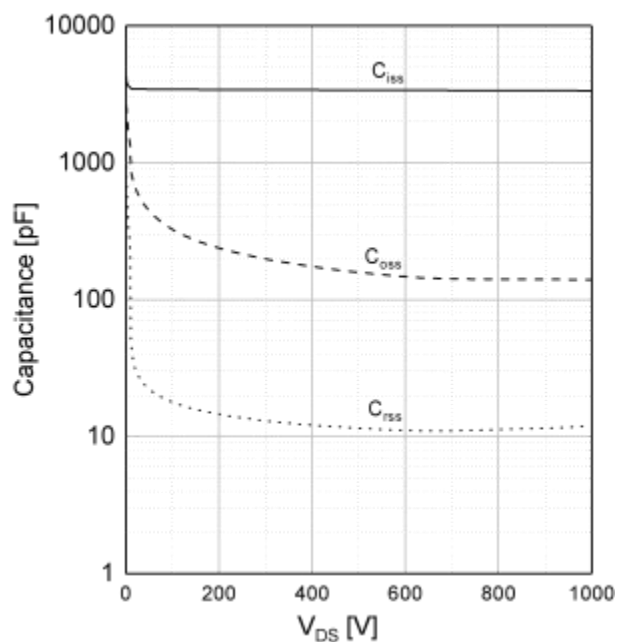
Capacitances= $f(V_{DS})$, $T_J=25^{\circ}C$, $V_{AC}=25mV$, $f=100KHz$, (0-200V)



电容

Capacitances

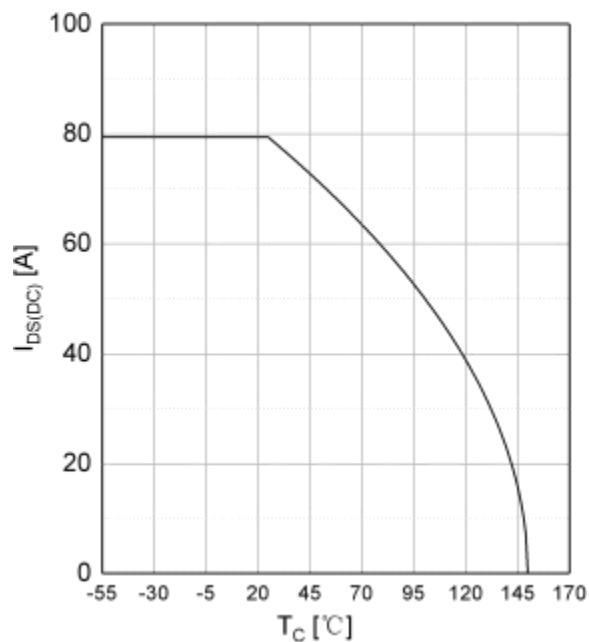
Capacitances= $f(V_{DS})$, $T_J=25^{\circ}C$, $V_{AC}=25mV$, $f=100KHz$, (0-1000V)



连续漏极电流衰减

Continuous Drain Current Derating

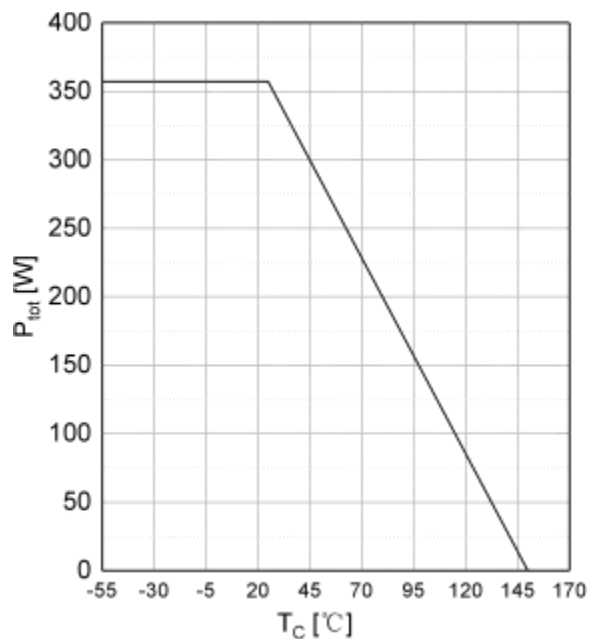
$$I_{DS(DC)} = f(T_C), T_J \leq 150^{\circ}C$$



最大功耗衰减

Maximum Power Dissipation Derating

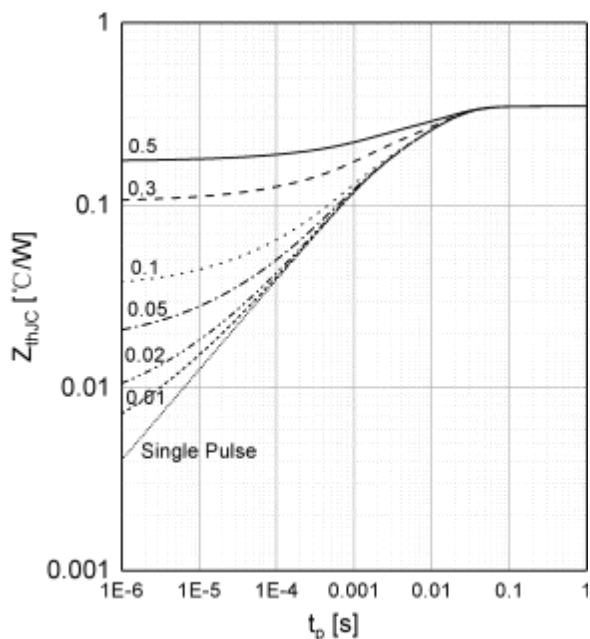
$$P_{tot}=f(T_c), T_c \leq 150^{\circ}\text{C}$$



瞬态热阻 (结-壳)

Transient Thermal Impedance (Junction-Case)

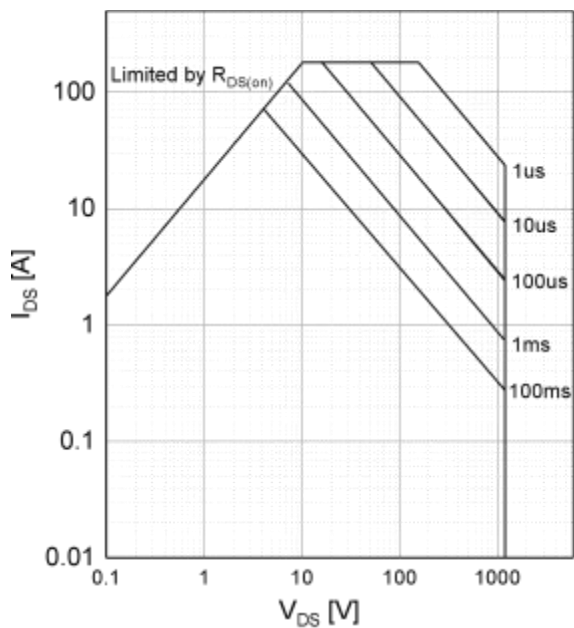
$$Z_{thJC}=f(t_p)$$



安全工作区

Safe Operating Area

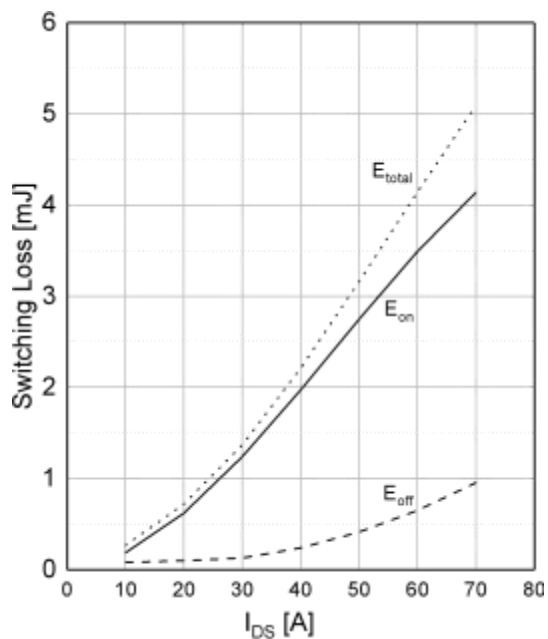
$$I_{DS}=f(V_{DS}), T_c=25^{\circ}\text{C}, D=0, \text{Parameter: } t_p$$



开关能量

Switching Energy

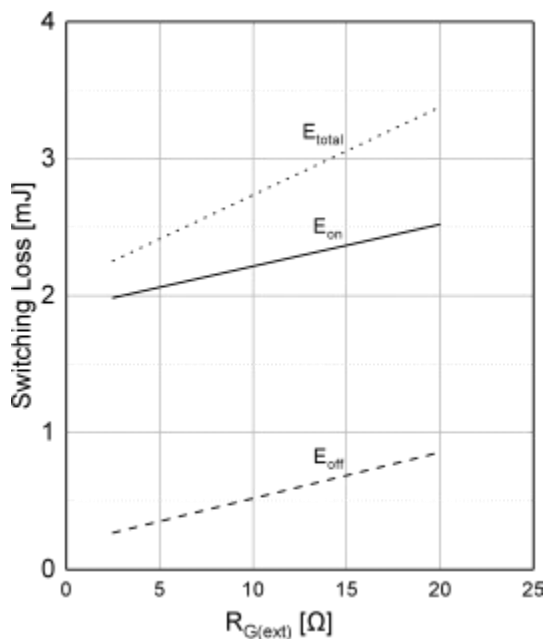
$$\text{Switching Loss}=f(I_{DS}), T_c=25^{\circ}\text{C}, V_{DD}=800\text{V}, R_{G(ext)}=2.5\Omega, V_{GS}=-5\text{V}/+18\text{V}, L=150\mu\text{H}$$



开关能量

Switching Energy

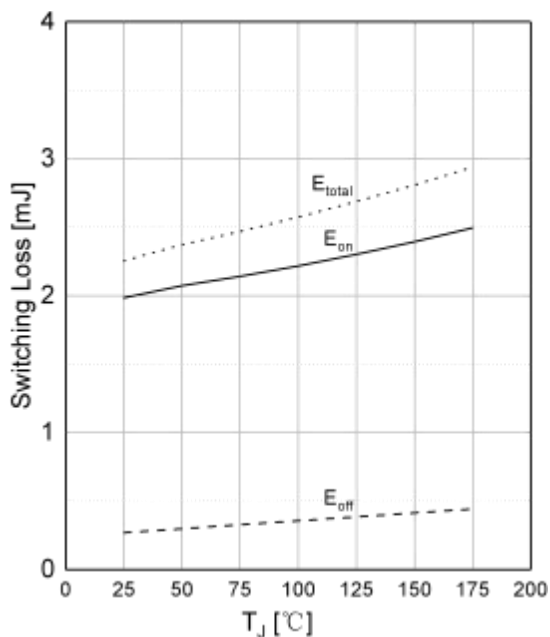
Switching Loss=f($R_{G(ext)}$), $T_J=25^{\circ}C$, $V_{DD}=800V$, $I_{DS}=40A$,
 $V_{GS}=-5V/+18V$, $L=150uH$



开关能量

Switching Energy

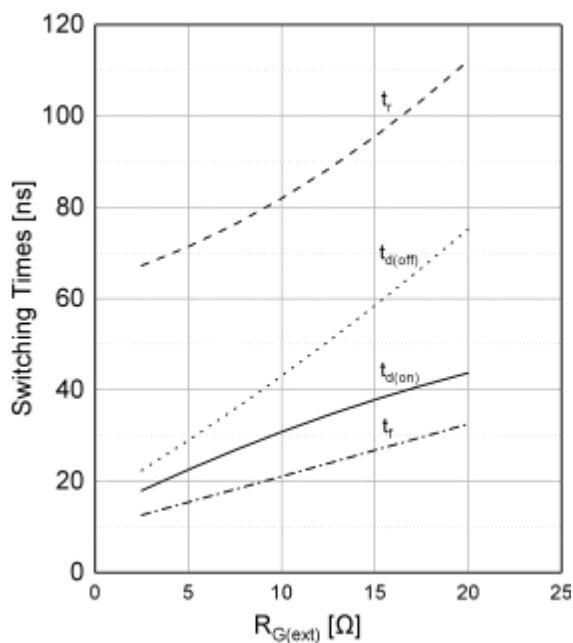
Switching Loss=f(T_J), $V_{DD}=800V$, $I_{DS}=40A$, $R_{G(ext)}=2.5\Omega$,
 $V_{GS}=-5V/+18V$, $L=150uH$



开关时间

Switching Times

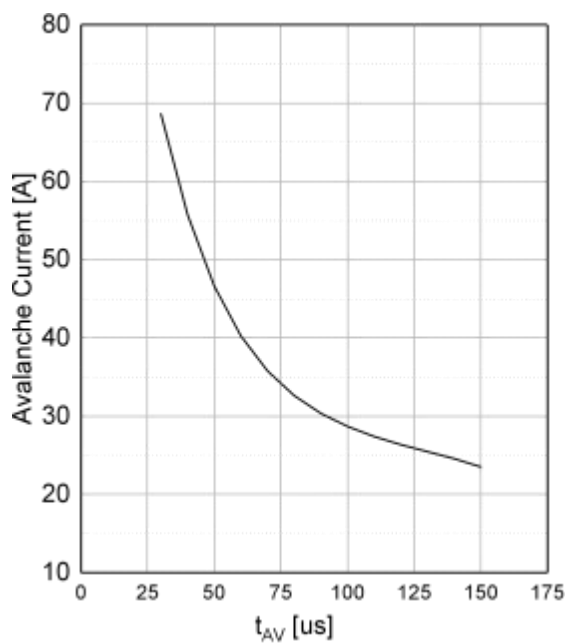
Switching Times=f($R_{G(ext)}$), $T_J=25^{\circ}C$, $V_{DD}=800V$, $I_{DS}=40A$,
 $V_{GS}=-5V/+18V$, $L=150uH$



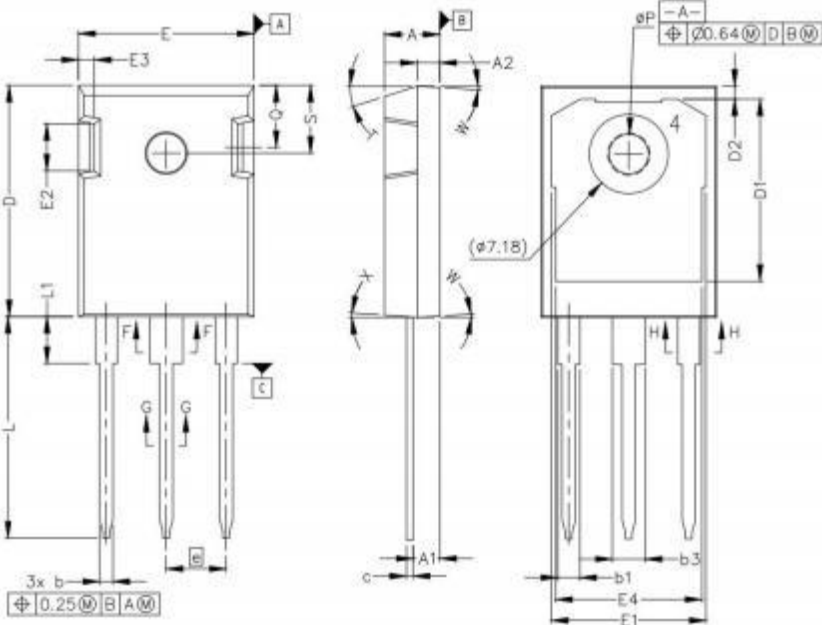
单次雪崩安全工作区

Single Avalanche Safe Operating Area

Avalanche Current=f(t_{AV}), $T_J=25^{\circ}C$, $V_{DD}=50V$

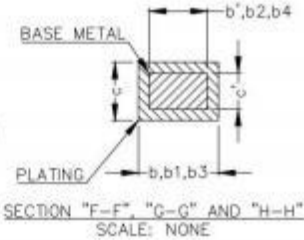


外形尺寸 Outline Drawing



NOTE:
 1. ALL METAL SURFACES, TIN PLATED EXCEPT AREA OF CUT
 2. DIMENSIONING & TOLERANCING CONFORM TO
 ASME Y14.5M-1994
 3. ALL DIMENSIONS ARE IN MILLIMETERS.
 ANGLES ARE IN DEGREES.
 4. THIS DRAWING WILL MEET ALL DIMENSIONS REQUIREMENT
 OF JEDEC OUTLINE TO-247 AD.

- 1 - GATE
- 2 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)
- 4 - DRAIN (COLLECTOR)



SYMBOL	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b'	1.07	1.28
b	1.07	1.33
b1	1.91	2.41
b2	1.91	2.16
b3	2.87	3.38
b4	2.87	3.13
c'	0.55	0.65
c	0.55	0.68
D	20.80	21.10
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
e	5.44 BSC	
N	3	
L	19.81	20.32
L1	4.10	4.40
φP	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
T	17.5° REF.	
W	3.5° REF.	
X	4° REF.	