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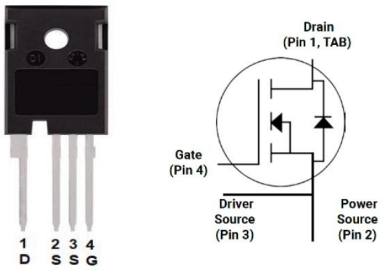
1200V 40mΩ 碳化硅功率MOSFET, TO-247-4L
1200V 40mΩ Silicon Carbide Power MOSFET, TO-247-4L

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
- 高频特性
  High-Frequency Operation
- 增强功率密度，降低散热需求
  Increased Power Density and Reduced Cooling Requirements
- 易于并联，驱动简单
  Easy to Parallel and Simple to Drive



TO-247-4

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

V_{DS}	1200V
I_{D}@25℃	78A
$R_{ds(on)}$	40mΩ

碳化硅功率MOSFET/ SiC Power MOSFET
最大额定值/ Maximum Rated Values (T_{vj}=25℃ 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=100uA	1200	V
栅极-源极电压 Gate-Source Voltage (dynamic)	V_{GSmax}	Absolute maximum values	-10/+25	V
栅极-源极电压 Gate-Source Voltage (static)	V_{GSop}	Recommended operational values	-5/+20	V
连续漏极电流 Continuous Drain Current	I_D	V_{GS}=20V, T_C=25℃	78	A
		V_{GS}=20V, T_C=100℃	57	
漏极脉冲电流 Pulsed Drain Current	$I_{D(pulse)}$	Pulse width t_p limited by T_{jmax}	TBD	A
耗散功率 Power Dissipation	P_D	T_C=25℃, T_J=175℃	405	W
工作结温 Operating Junction Temperature	$T_{vj, op}$		-55~175	℃
存储温度范围 Storage Temperature Range	T_{stg}		-55~175	℃

电特性 Electrical Characteristics (T_{vj}=25℃ unless otherwise noted)

参数 Parameter	符号 Symbol	条件 Condition		数值 Value Min	Typ.	Max	单位 Unit
漏极-源极阻断电压 Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=100μA		1200			V
栅极阈值电压 Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=10mA	T_{vj}=25℃	2	2.5	4	V
			T_{vj}=175℃		1.5		
零栅压漏极电流 Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=1200V, V_{GS}=0V			5	100	μA
栅极-源极漏电流 Gate-Source Leakage Current	I_{GSS}	V_{GS}=20V, V_{DS}=0V			10	200	nA
		V_{GS}=-10V, V_{DS}=0V		-200	-10		
漏极-源极导通电阻 Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS}=20 V, I_D=40A	T_{vj}=25℃		40	50	mΩ
			T_{vj}=175℃		59		
跨导 Transconductance	g_{fs}	V_{DS}=20V, I_{DS}=40A	T_{vj}=25℃		10.4		S
			T_{vj}=175℃		7.7		
输入电容 Input Capacitance	C_{iss}	V_{GS}=0V V_{DS}=1000V f=100kHz V_{AC}=25mV			2101		pF
输出电容 Output Capacitance	C_{oss}				161		
反向传输电容 Reverse Transfer Capacitance	C_{rss}				14		
输出电容存储能量 C_{oss} Stored Energy	E_{oss}				90		μJ
单脉冲雪崩能量 Avalanche Energy, Single Pluse	E_{AS}				TBD		J
导通能量 Turn-On Switching Energy	E_{ON}	V_{DS}=800V, V_{GS}=-5/20V I_D=40A, $R_{G(ext)}$=2.5Ω, L=100μH			1.1		mJ
关断能量 Turn Off Switching Energy	E_{OFF}				0.9		
导通延迟时间 Turn-On Delay Time	$t_{d(on)}$	V_{DD}=800V, V_{GS}=-5/20V I_D=40A $R_{G(ext)}$=2.5Ω, R_L=20Ω Timing relative to V_{DS}			22		ns
上升时间 Rise Time	t_r				49		
关断延迟时间 Turn-Off Delay Time	$t_{d(off)}$				71		
下降时间 Fall Time	t_f				23		
栅极输入电阻 Internal Gate Resistance	$R_{G(int)}$	f=1MHz, V_{AC}=25mV			1.7		Ω
栅源电荷 Gate to Source Charge	Q_{gs}	V_{DS}=800V, V_{GS}=-5/20V I_D=40A			33		nC
栅漏电荷 Gate to Drain Charge	Q_{gd}				51		
栅极总电荷 Total Gate Charge	Q_g				131		

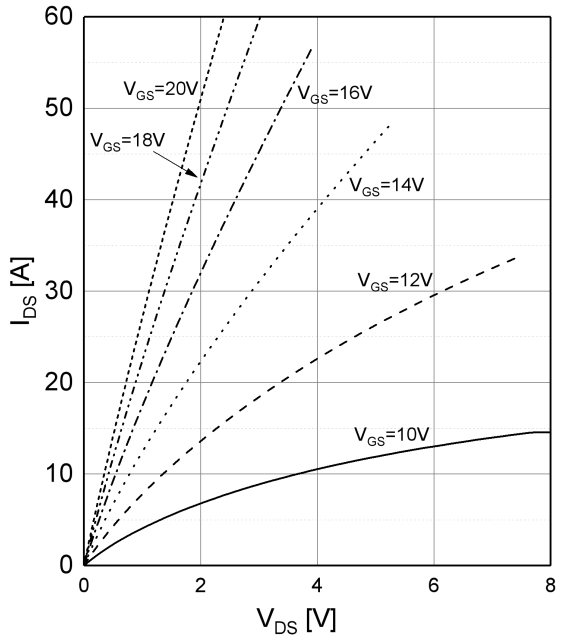
体二极管特性 Body Diode Characteristics (T_{vj}=25℃ unless otherwise noted)

参数 Parameter	符号 Symbol	条件 Condition		数值 Value Min	Typ.	Max	单位 Unit
二极管正向电压 Diode Forward Voltage	V_{SD}	V_{GS}=-5V, I_{SD}=20A	T_{vj}=25℃		4.1		V
			T_{vj}=175℃		3.5		
二极管连续正向电流 Continuous Diode Forward Current	I_S	V_{GS}=-5V, T_C=25˚C				83	A
反向恢复时间 Reverse Recovery Time	t_{rr}	V_{GS}=-5V, I_{SD}=40A V_R=800V dif/dt=1165A/μs			56		ns
反向恢复电荷 Reverse Recovery Charge	Q_{rr}				508		nC
反向恢复峰值电流 Peak Reverse Recovery Current	I_{rrm}				18		A

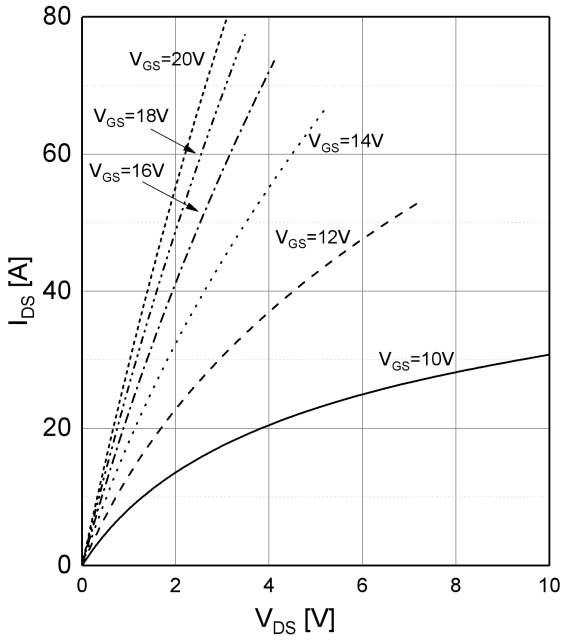
热特性 Thermal Characteristics

参数 Parameter	符号 Symbol	条件 Condition	数值 Value Min	Typ.	Max	单位 Unit
结-壳热阻 Thermal Resistance: Junction to Case	$R_{th(J-C)}$			0.25	0.37	K/W

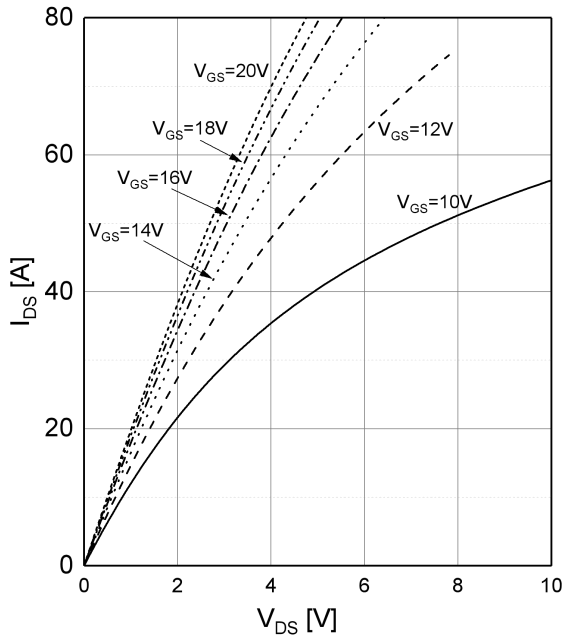
输出特性
Output characteristics
$I_{DS}=f(V_{DS})$, T_J=-55℃



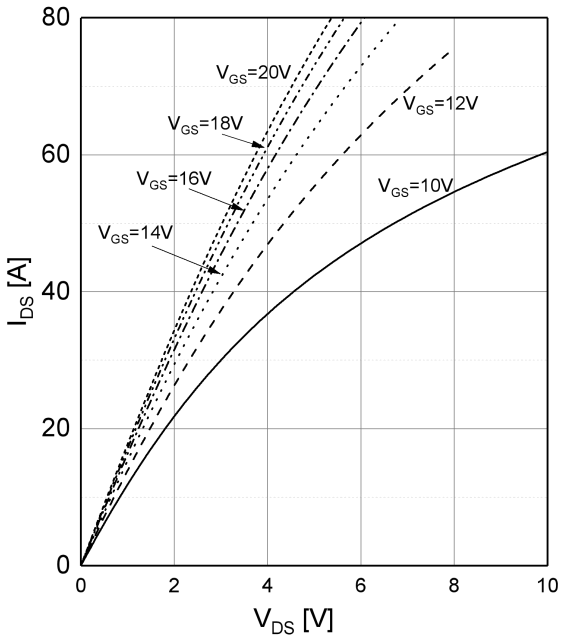
输出特性
Output characteristics
$I_{DS}=f(V_{DS})$, T_J=25℃



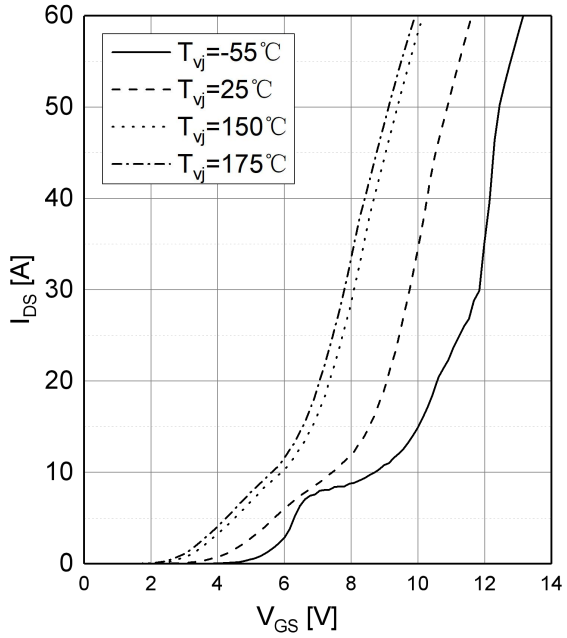
输出特性
Output characteristics
$I_{DS}=f(V_{DS})$, T_J=150℃



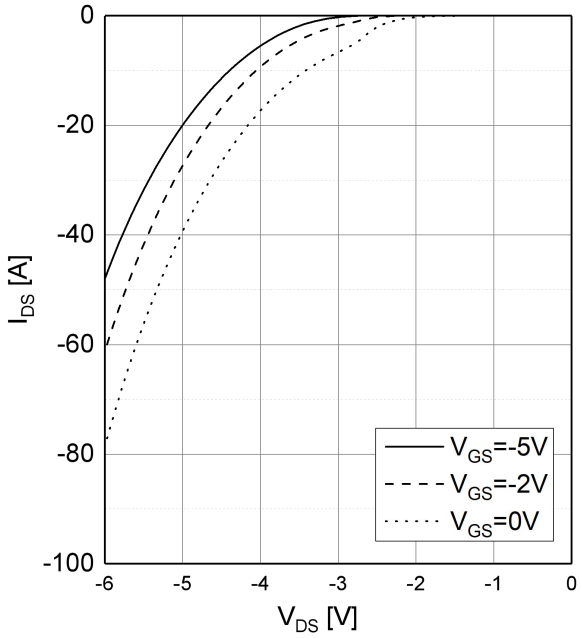
输出特性
Output characteristics
$I_{DS}=f(V_{DS})$, T_J=175℃



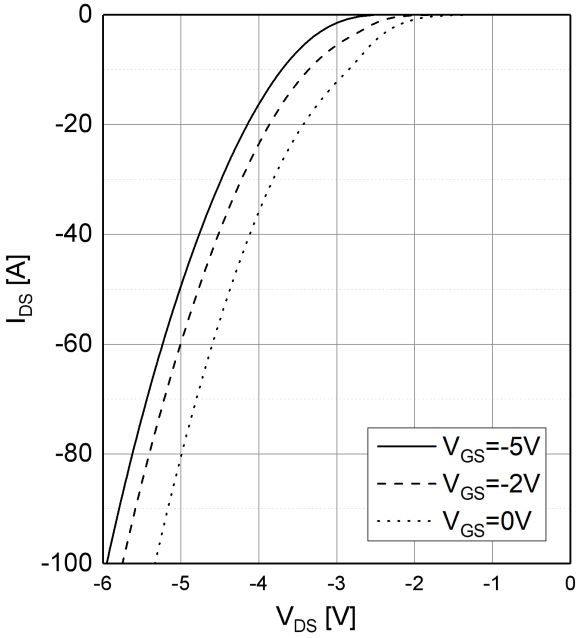
转移特性
Transfer Characteristics
$I_{DS}=f(V_{GS})$, $V_{DS}=20V$



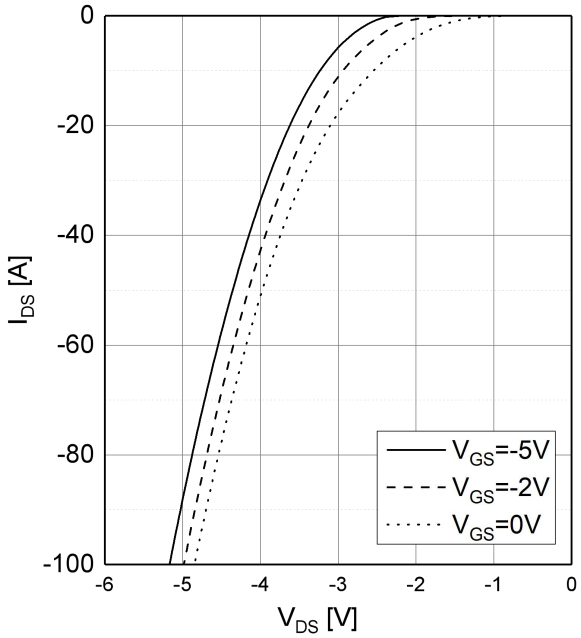
体二极管导通特性
Body Diode Characteristics
$I_{DS}=f(V_{DS})$, T_J=-55℃



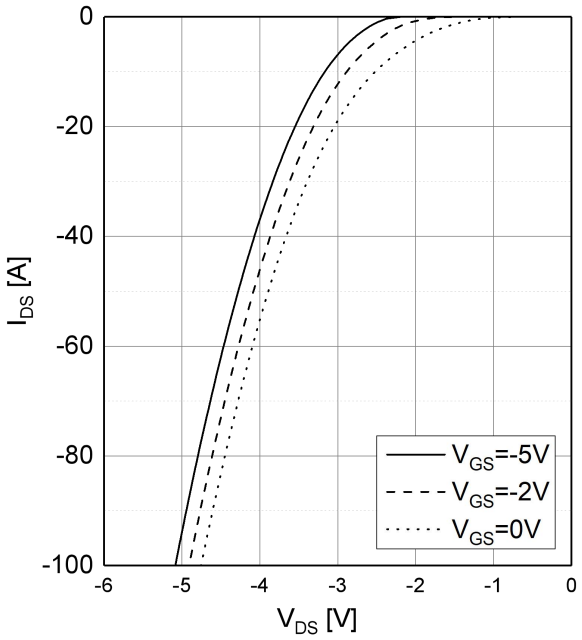
体二极管导通特性
Body Diode Characteristics
$I_{DS}=f(V_{DS})$, T_J=25℃



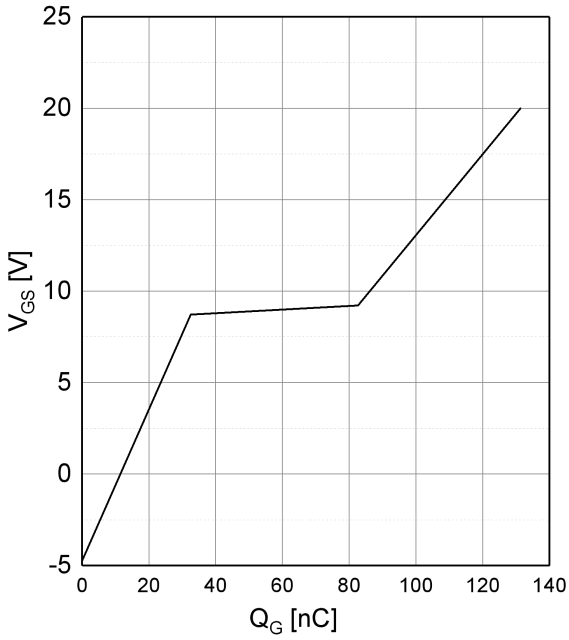
体二极管导通特性
Body Diode Characteristics
$I_{DS}=f(V_{DS})$, T_J=150℃



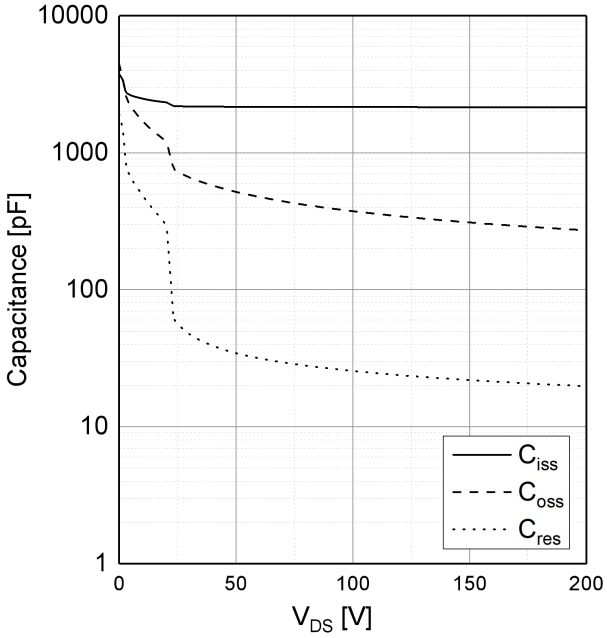
体二极管导通特性
Body Diode Characteristics
$I_{DS}=f(V_{DS})$, $T_J=175℃$



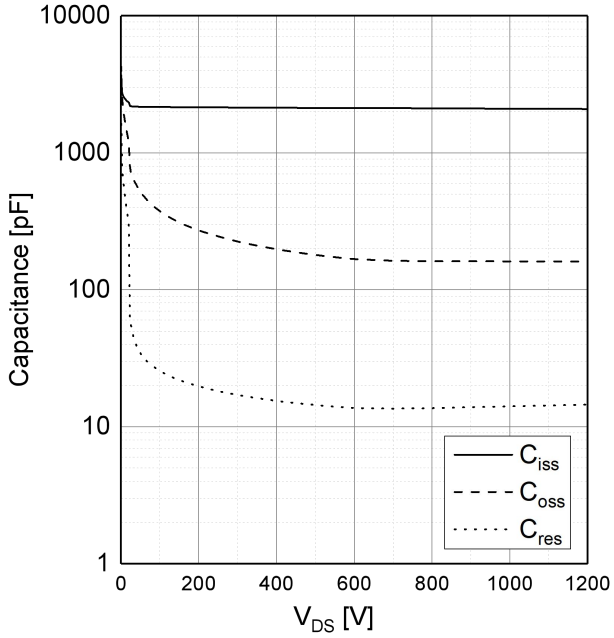
栅极电荷特性
Gate Charge Characteristics
$V_{GS}=f(Q_G)$, $I_{DS}=40A$, $V_{DS}=800V$, $T_J=25℃$



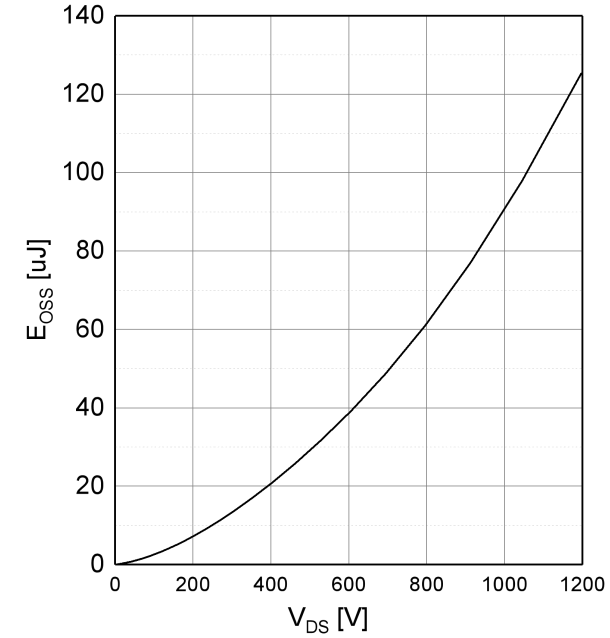
电容 vs 漏极-源极电压（0-200V）
Capacitances vs Drain-Source Voltage (0-200V)
$C=f(V_{DS})$, $T_J=25℃$, $V_{AC}=25mV$, $f=100KHz$



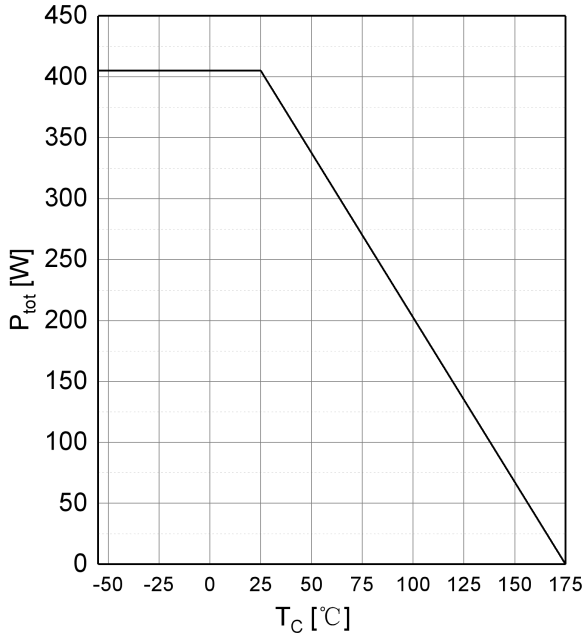
电容 vs 漏极-源极电压（0-1200V）
Capacitances vs Drain-Source Voltage (0-1200V)
$C=f(V_{DS})$, $T_J=25℃$, $V_{AC}=25mV$, $f=100KHz$



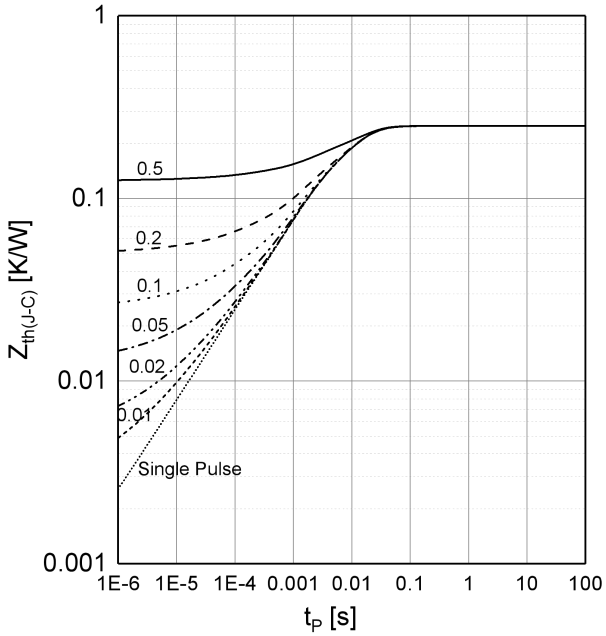
输出电容存储能量
Output Capacitor Stored Energy
E_{OSS} =f(V_{DS}), T_J=25℃



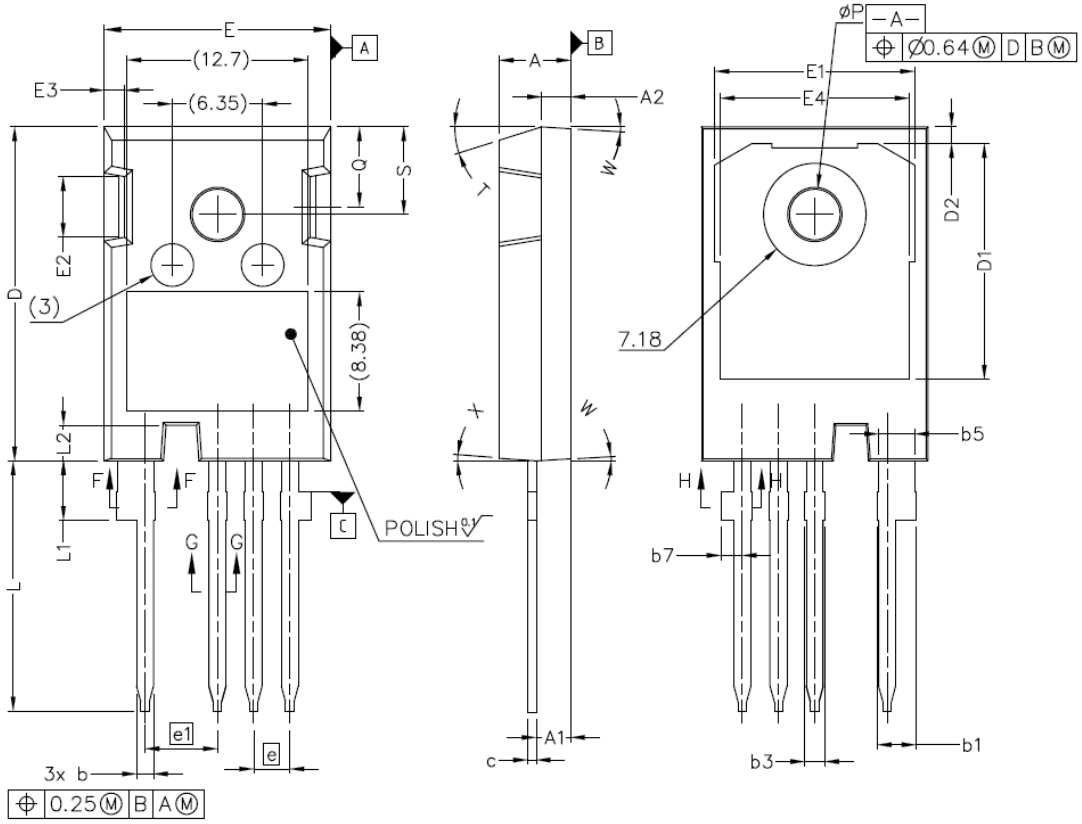
最大功耗衰减
Maximum Power Dissipation Derating
P_{tot} =f(T_C), T_J≤175℃



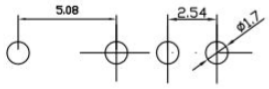
结-壳瞬态热阻
Transient Thermal Impedance (Junction to Case)
$Z_{th(J-C)}$=f(t), T_C=25℃



外形尺寸 Outline Drawing



RECOMMENDED LAND PATTERN



UNIT: mm

	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.25	2.40	2.45
A2	1.85	2.00	2.15
b	1.05	1.20	1.35
b1	1.00	1.30	1.60
b2	2.35	2.65	2.95
c	0.50	0.60	0.70
D	22.34	22.54	22.74
D1	16.00	16.50	17.00
D2	0.97	1.17	1.37
e	2.34	2.54	2.74
e1	4.88	5.08	5.28
E	15.60	15.80	16.00
E1	13.50	14.00	14.50
E2	4.80	5.00	5.20
L	18.08	18.38	18.68
L1	2.38	2.58	2.78
p	3.50	3.60	3.70
p1	6.60	6.80	7.00
Q	6.00	6.15	6.30
S	6.00	6.15	6.30

修订记录 Revision History

版本 Version	日期 Date	描述 Description
v1.0	2022-03-29	