

描述 / Descriptions

TO-251 塑封封装 P 沟道 MOS 场效应管。 P-CHANNEL MOSFET in a TO-251 Plastic Package.

特征 / Features

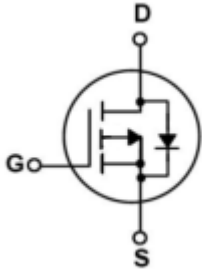
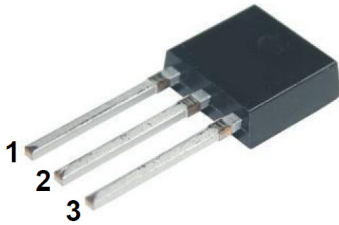
$R_{DS(on)}$ 小, 门电荷低, C_{rSS} 小, 开关速度快。

Low $R_{DS(on)}$, low gate charge, low C_{rSS} , fast switching.

用途 / Applications

用于低压电路如: 汽车电路、DC/DC 转换、便携式产品的电源高效转换。

Suited for low voltage applications such as automotive, DC/DC Converters, and high efficiency switching for power management in portable and battery operated products.

内部等效电路 / Equivalent Circuit**引脚排列 / Pinning**

PIN 1 : G

PIN 2 : D

PIN 3 : S

PIN 4 : D

放大及印章代码 / h_{FE} Classifications & Marking

见印章说明。 See Marking Instructions.

极限参数 / Absolute Maximum Ratings(Ta=25°C)

参数 Parameter	符号 Symbol	数值 Rating	单位 Unit
Drain-Source Voltage	V_{DSS}	-100	V
Drain Current	$I_D(T_C=25^\circ\text{C})$	-30	A
Drain Current	$I_D(T_C=100^\circ\text{C})$	-21.5	A
Drain Current - Pulsed ^C	I_{DM}	-80	A
Gate-Source Voltage	V_{GS}	±20	V
Avalanche Current ^C	I_{AS}	-27.0	A
Avalanche energy L=0.5mH ^C	E_{AS}	291.6	mJ
Power Dissipation ^B	$P_D(T_C=25^\circ\text{C})$	53.5	W
	$P_D(T_C=100^\circ\text{C})$	26.5	W
Power Dissipation ^A	$P_{DSM}(T_A=25^\circ\text{C})$	2.5	W
	$P_{DSM}(T_A=70^\circ\text{C})$	1.6	W
Junction and Storage Temperature Range	T_J, T_{stg}	-55~150	°C

电性能参数 / Electrical Characteristics(Ta=25°C)

参数 Parameter	符号 Symbol	测试条件 Test Conditions	最小值 Min	典型值 Typ	最大值 Max	单位 Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V \quad I_D=-250\mu A$	-100			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-100V \quad V_{GS}=0V$			-1.0	μA
		$V_{DS}=-100V \quad V_{GS}=0V$ $T_J=55^\circ\text{C}$			-5.0	μA
Gate-Body Leakage Current Forward	I_{GSS}	$V_{GS}=\pm 20V \quad V_{DS}=0V$			±0.1	μA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS} \quad I_D=250\mu A$	-1	-1.7	-3	V
Static Drain-Source On-Resistance	$R_{DS(on)1}$	$V_{GS}=-10V \quad I_D=-30A$		46	50	mΩ
	$R_{DS(on)2}$	$V_{GS}=-4.5V \quad I_D=-15A$		49	51	mΩ
Forward Transconductance	g_{FS}	$V_{DS}=-10V \quad I_D=-10A$		25		S
Diode Forward Voltage	V_{SD}	$I_S=-30A \quad V_{GS}=0V$		-0.72	-1.3	V

电性能参数 / Electrical Characteristics(Ta=25°C)

参数 Parameter	符号 Symbol	测试条件 Test Conditions	最小值 Min	典型值 Typ	最大值 Max	单位 Unit
Input Capacitance	C _{iss}	V _{DS} =-25V V _{GS} =0V f=1.0MHz		5110		pF
Output Capacitance	C _{oss}			198		
Reverse Transfer Capacitance	C _{rss}			131		
Gate resistance	R _g	V _{GS} =0V V _{DS} =0V f=1MHz		3.87		Ω
Total Gate Charge	Q _g (10V)	V _{GS} =-10V V _{DS} =-50V I _D =-20A		16.5	25	nC
Total Gate Charge	Q _g (4.5V)			7	12	
Gate Source Charge	Q _{gs}			4.5		
Gate Drain Charge	Q _{gd}			2.5		
Turn-On Delay Time	t _{d(on)}	V _{GS} =-10V V _{DS} =-50V R _L =2.5Ω R _{GEN} =23Ω		7		ns
Turn-On Rise Time	t _r			8		
Turn-Off Delay Time	t _{d(off)}			20		
Turn-Off Fall Time	t _f			3		
Body Diode Reverse Recovery Time	t _{rr}	I _F =-20A dI/dt=500A/ms		30		ns
Body Diode Reverse Recovery Charge	Q _{rr}	I _F =-20A dI/dt=500A/ms		145		nC
Maximum Junction-to-Ambient ^A	R _{θJA}	t ≤ 10s		16	20	°C/W
Maximum Junction-to-Ambient ^{AD}		steady-State		41	50	°C/W
Maximum Junction-to-Case	R _{θJC}	steady-State		2.2	2.8	°C/W

A. The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The Power dissipation PDSM is based on R qJA and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be used if the PCB allows it.

B. The power dissipation PD is based on T_{J(MAX)}=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C. Ratings are based on low frequency and duty cycles to keep initial T_J =25°C.

D. The RqJA is the sum of the thermal impedance from junction to case RqJC and case to ambient.

E. The static characteristics in Figures 1to6 are obtained using <300ms pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=150°C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C.

电参数曲线图 / Electrical Characteristic Curve

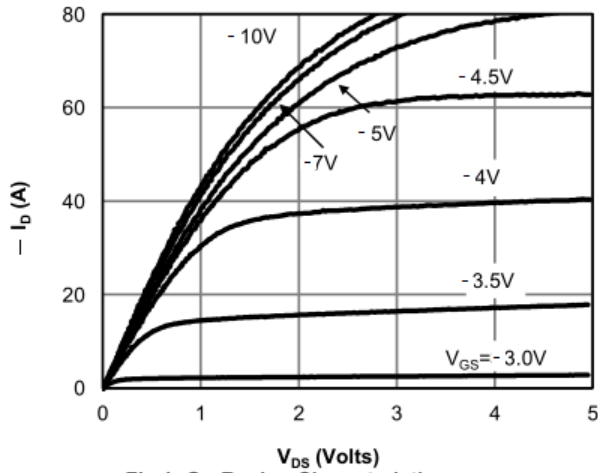


Fig 1: On-Region Characteristics

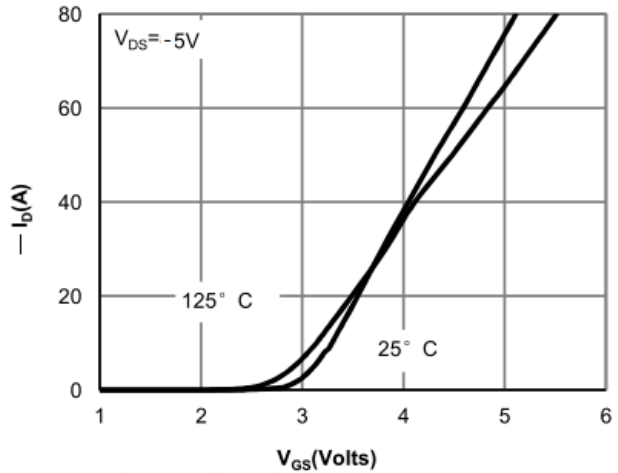


Figure 2: Transfer Characteristics

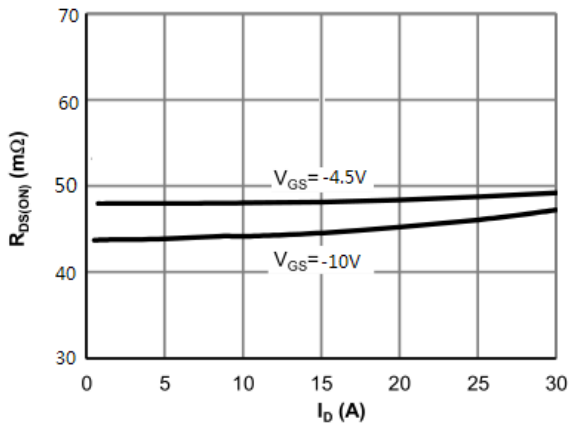


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

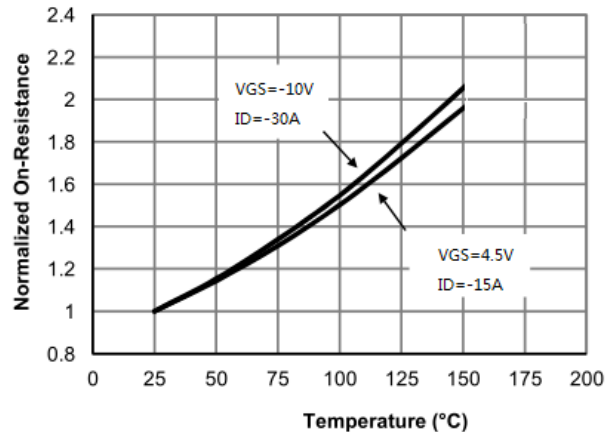


Figure 4: On-Resistance vs. Junction Temperature

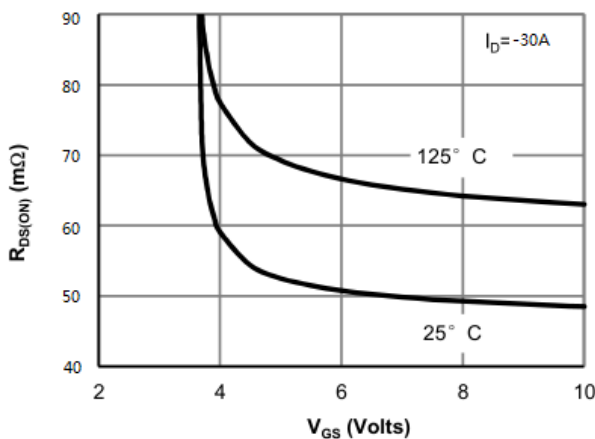


Figure 5: On-Resistance vs. Gate-Source Voltage

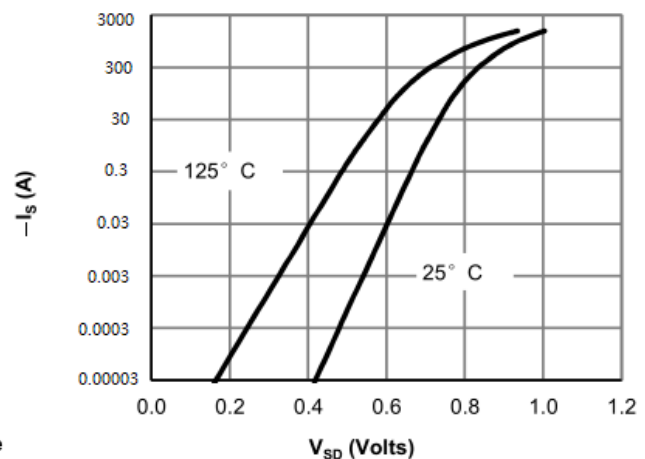


Figure 6: Body-Diode Characteristics

电参数曲线图 / Electrical Characteristic Curve

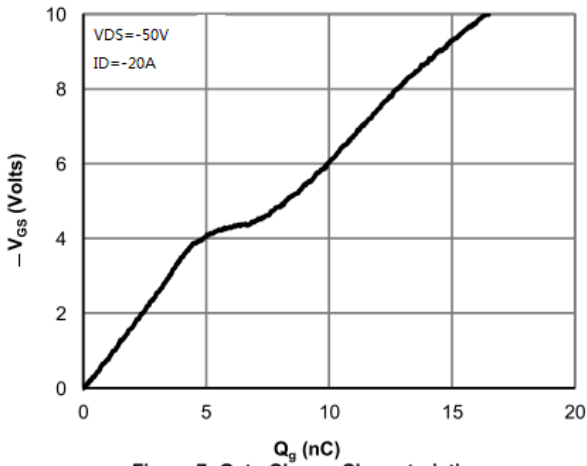


Figure 7: Gate-Charge Characteristics

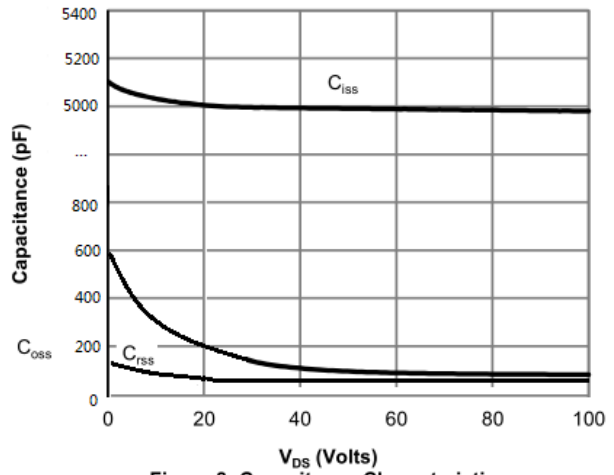


Figure 8: Capacitance Characteristics

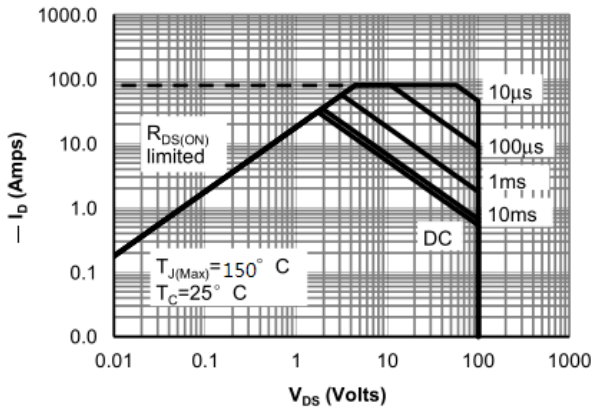


Figure 9: Maximum Forward Biased Safe Operating Area

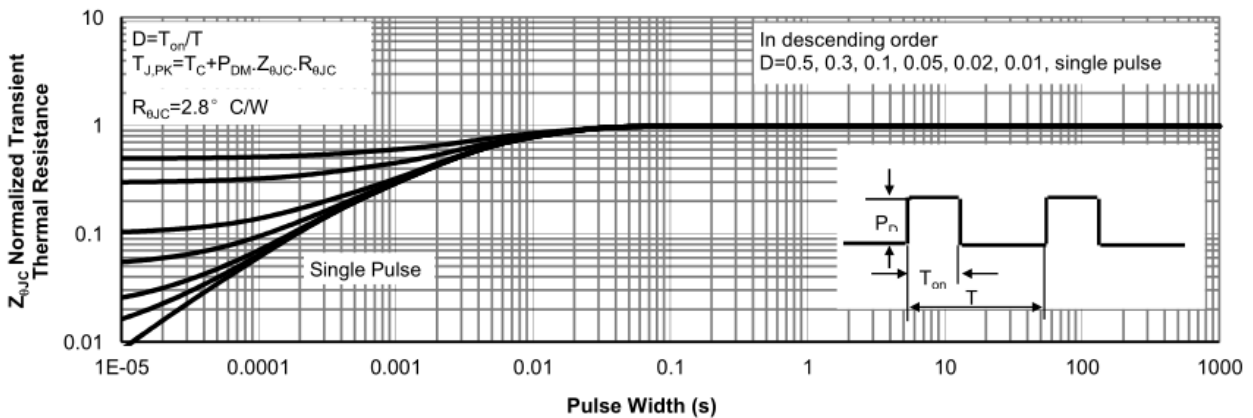
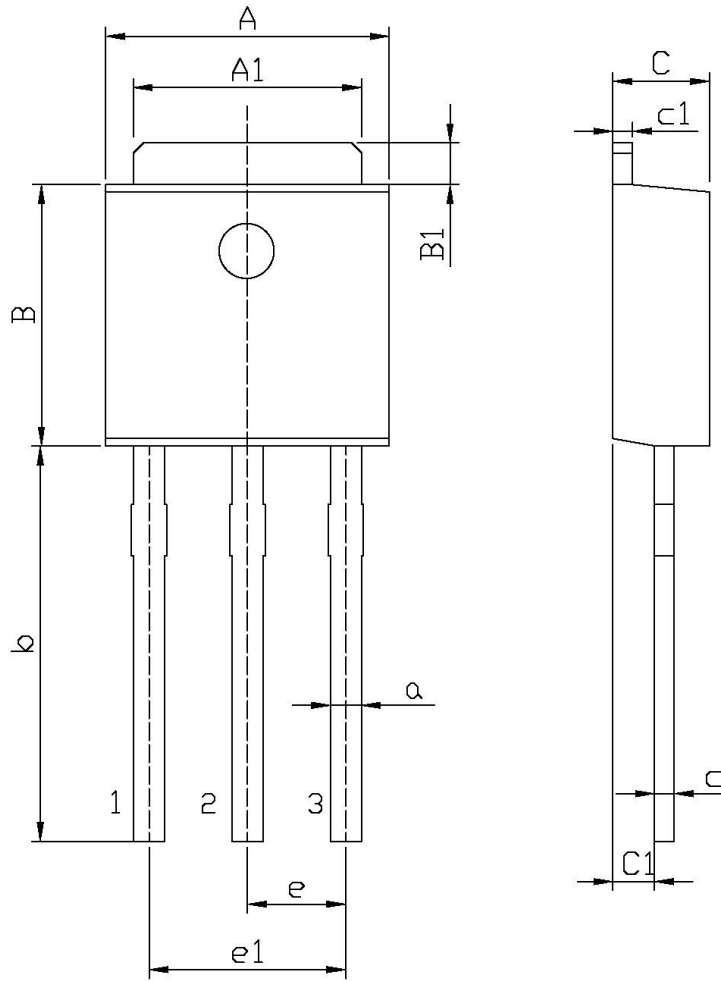


Figure 10: Normalized Maximum Transient Thermal Impedance

外形尺寸图 / Package Dimensions

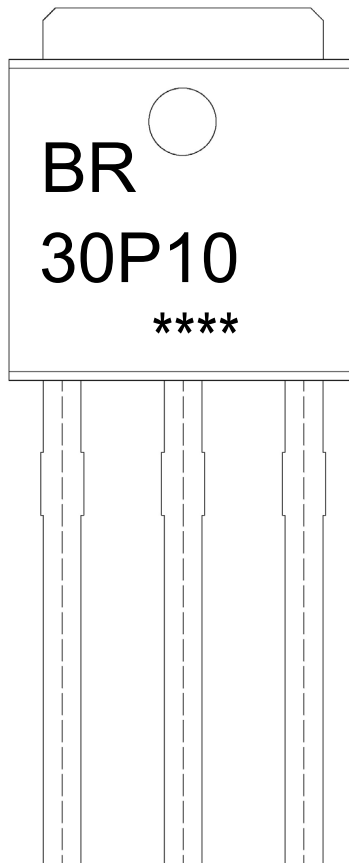


单位: mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	6.45	6.75	a	0.50	0.70
A1	5.10	5.50	b	9.00	9.40
B	5.95	6.25	c	0.45	0.55
B1	0.95	1.25	c1	0.45	0.55
C	2.20	2.40	e	2.24	2.34
C1	0.95	1.15	e1	4.43	4.73

TO-251

印章说明 / Marking Instructions



说明：

BR： 为公司代码

30P10： 为型号代码

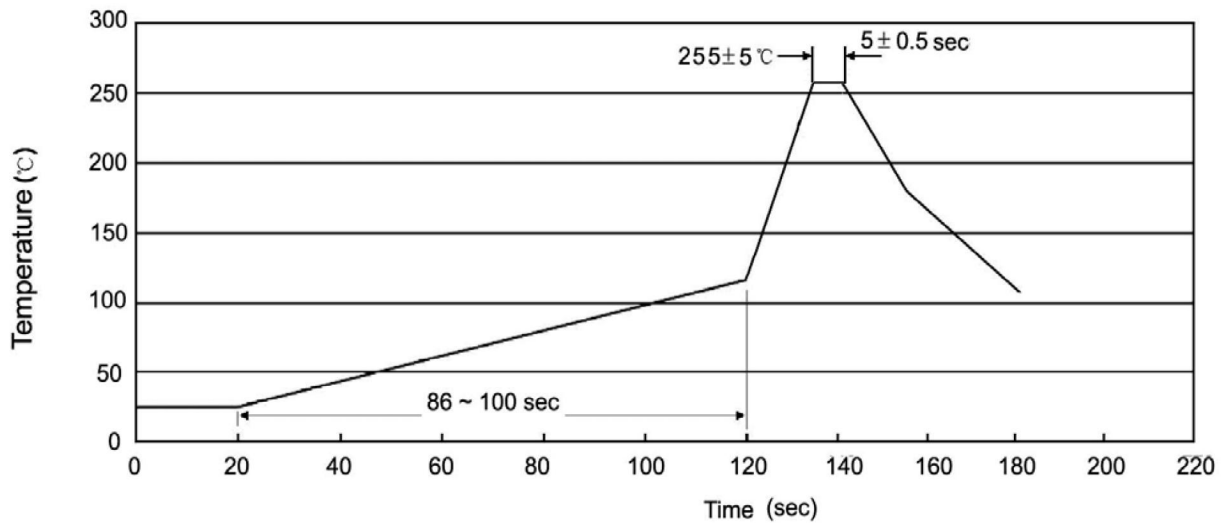
****： 为生产批号代码，随生产批号变化。

Note:

BR: Company Code

30P10: Product Type Code.

****: Lot No. Code, code change with Lot No.

回流焊温度曲线图(无铅) / Temperature Profile for IR Reflow Soldering(Pb-Free)


说明：

- 1、预热温度 25 ~ 150°C，时间 60 ~ 90sec；
- 2、峰值温度 255±5°C，时间持续为 5±0.5sec；
- 3、焊接制程冷却速度为 2 ~ 10°C/sec.

Note:

- 1.Preheating:25~150°C, Time:60~90sec.
- 2.Peak Temp.:255±5°C, Duration:5±0.5sec.
3. Cooling Speed: 2~10°C/sec.

耐焊接热试验条件 / Resistance to Soldering Heat Test Conditions

温度：270±5°C

时间：10±1 sec.

Temp.:270±5°C

Time:10±1 sec

包装规格 / Packaging SPEC.

散件包装 / REEL

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit: mm ³)		
	Units/Reel 只/卷盘	Reels/Inner Box 卷盘/盒	Units/Inner Box 只/盒	Inner Boxes/Outer Box 盒/箱	Units/Outer Box 只/箱	Reel	Inner Box 盒	Outer Box 箱
TO-251	1,000	10	10,000	5	50,000	135×190	237×172×102	560×245×195

套管包装 / TUBE

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit: mm ³)		
	Units/Tube 只/套管	Tubes/Inner Box 套管/盒	Units/Inner Box 只/盒	Inner Boxes/Outer Box 盒/箱	Units/Outer Box 只/箱	Tube 套管	Inner Box 盒	Outer Box 箱
TO-251/252	75	48	3,600	5	18,000	526×20.5×5.25	555×164×50	575×290×180

使用说明 / Notices