描述 / Descriptions

P 沟道 TO-252 塑封封装场效应管。

P-CHANNEL MOSFET in a TO-252 Plastic Package.

特征 / Features

大电流输出能力，符合 AEC-Q101 标准高可靠性要求，无卤产品。

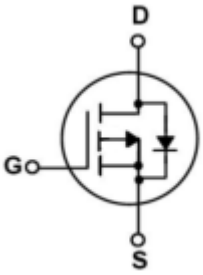
High Current Capability, Qualified to AEC-Q101 Standards for High Reliability, HF Product.

用途 / Applications

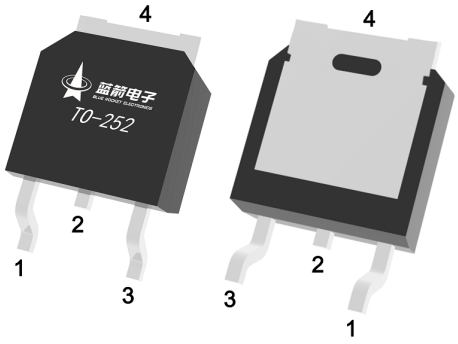
交流负载开关，蓄电池充电/放电保护，满足汽车应用的严格要求。

AC-in load switch,Battery protection charge/discharge, Meet the stringent requirements of automotive applications.

内部等效电路 / Equivalent Circuit



引脚排列 / Pinning



PIN1：G　　PIN 2：D　　PIN 3：S　　PIN 4：D

印章代码 / Marking

见印章说明。

See Marking Instructions.

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

参数 Parameter		符号 Symbol	数值 Rating	单位 Unit
Drain-Source Voltage		V_{DSS}	-60	V
Drain Current		I_D(Tc=25℃)	-20	A
Drain Current - Pulsed		I_{DM}	-80	A
Gate-Source Voltage		V_{GS}	±20	V
Avalanche Current		I_{AS}	13.8	A
Avalanche energy L=0.5mH		E_{AS}	65	mJ
Power Dissipation		P_D(Tc=25℃)	20	W
		P_D(Tc=100℃)	10	W
Junction and Storage Temperature Range		T_j, T_{stg}	-55～150	℃
Maximum Junction-to-Ambient	t ≤ 10s	$R_{\theta JA}$	30	℃/W
Maximum Junction-to-Ambient	Steady-State		60	
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	7.5	

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

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 I_D=-250μA	-60	-70		V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-60V V_{GS}=0V			-1.0	μA
		V_{DS}=-60V V_{GS}=0V T_J=55°C			-5.0	μA
Gate-Body Leakage Current Forward	I_{GSS}	V_{GS}=±20V V_{DS}=0V			±0.1	μA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} I_D=250μA	-1	-1.7	-2.5	V
Static Drain-Source On-Resistance	$R_{DS(on)1}$	V_{GS}=-10V I_D=-20A		87	92	mΩ
	$R_{DS(on)2}$	V_{GS}=-4.5V I_D=-10A		98	102	mΩ
Diode Forward Voltage	V_{SD}	I_S=-1A V_{GS}=0V		-0.7	-1.2	V

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

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		1650		pF
Output Capacitance	C_{oss}			330		
Reverse Transfer Capacitance	C_{rss}			205		
Gate resistance	R_g	V_{GS}=0V V_{DS}=0V f=1MHz		6.4		Ω
Total Gate Charge	Q_g(10V)	V_{GS}=-10V V_{DS}=-30V I_D=-12A		7.5		nC
Total Gate Charge	Q_g(4.5V)			3.8		
Gate Source Charge	Q_{gs}			1.2		
Gate Drain Charge	Q_{gd}			1.9		
Turn-On Delay Time	$t_{d(on)}$	V_{GS}=-10V V_{DS}=-30V R_L=2.5Ω R_{GEN}=3Ω		4.2		ns
Turn-On Rise Time	t_r			3.4		
Turn-Off Delay Time	$t_{d(off)}$			16		
Turn-Off Fall Time	t_f			2		
Body Diode Reverse Recovery Time	t_{rr}	I_F=-12A dI/dt=500A/ms		27		ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F=-12A dI/dt=500A/ms		30		nC

电参数曲线图 / Electrical Characteristic Curve

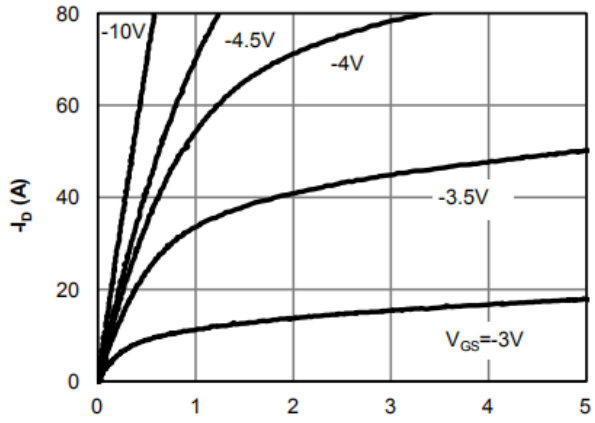
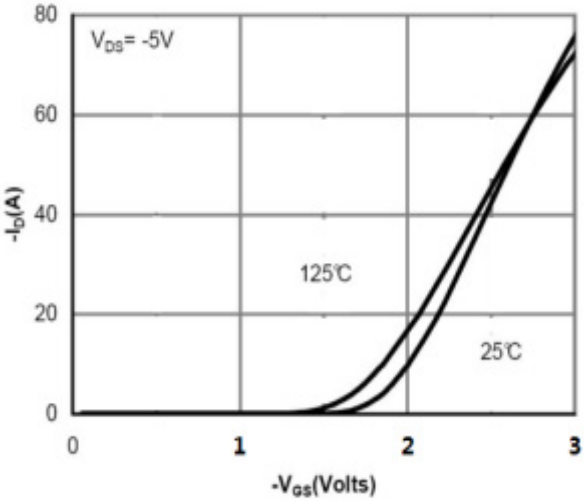


Figure 1: On-Region Characteristics



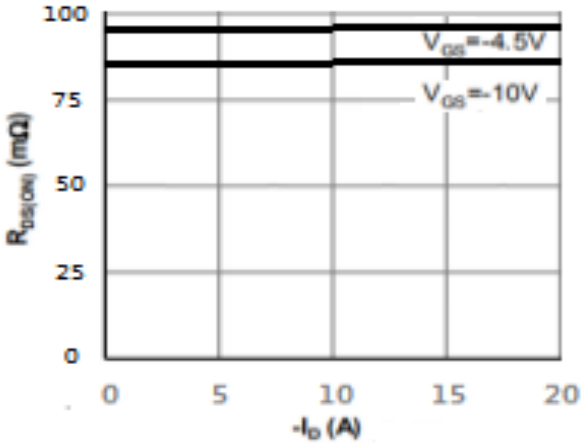


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

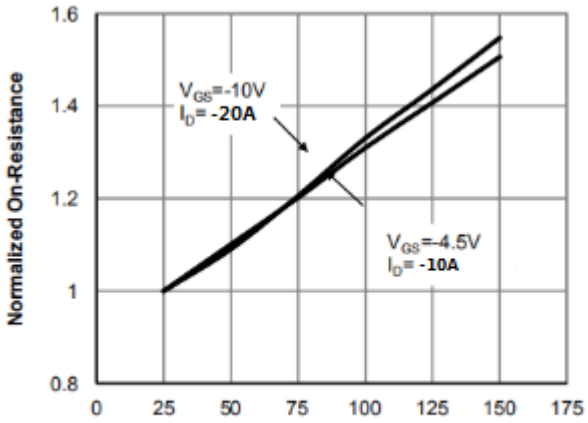


Figure 4: On-Resistance vs. Junction Temperature

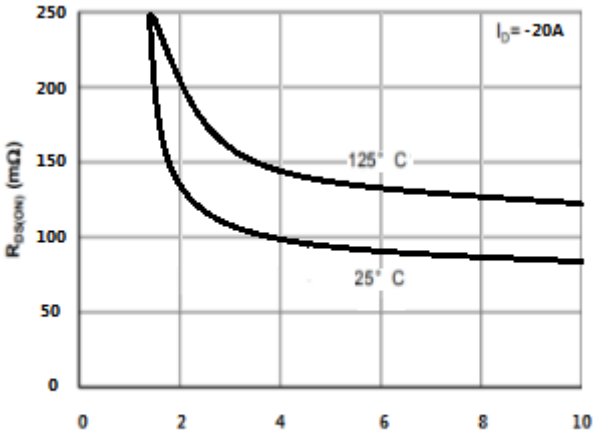


Figure 5: On-Resistance vs. Gate-Source Voltage

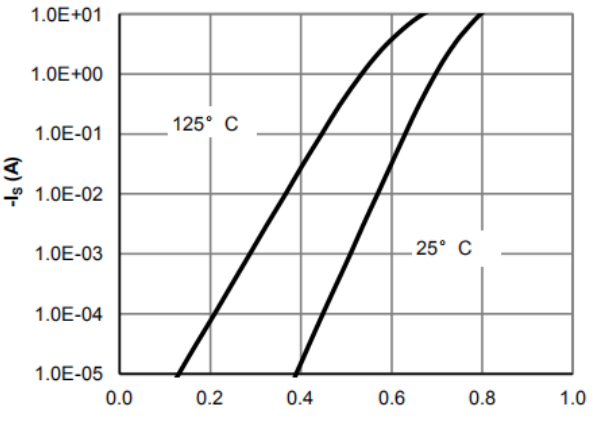


Figure 6: Body-Diode Characteristics

电参数曲线图 / Electrical Characteristic Curve

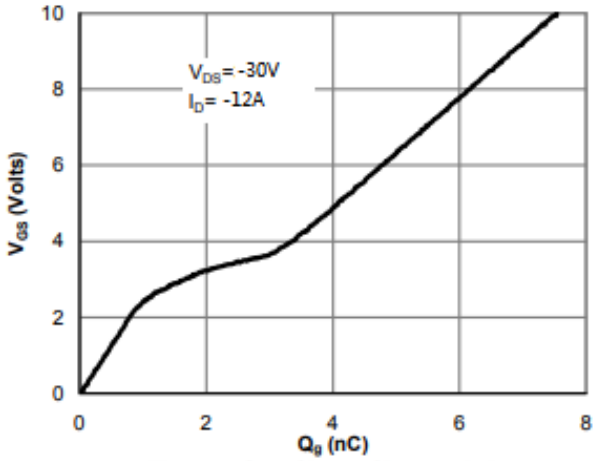


Figure 7: Gate-Charge Characteristics

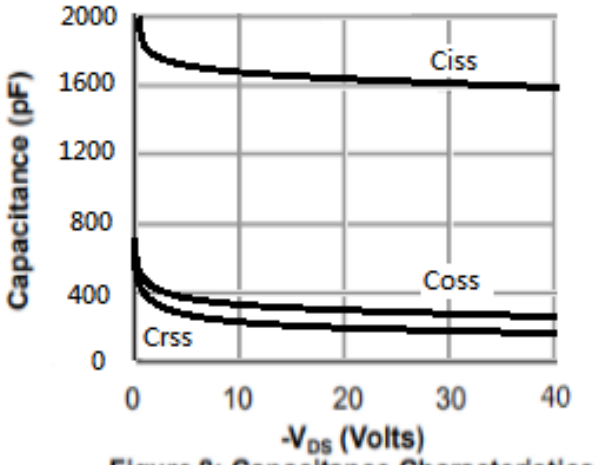


Figure 8: Capacitance Characteristics

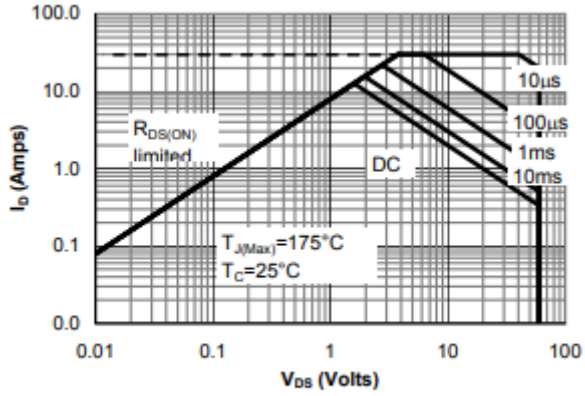


Figure 9: Maximum Forward Biased Safe Operating Area

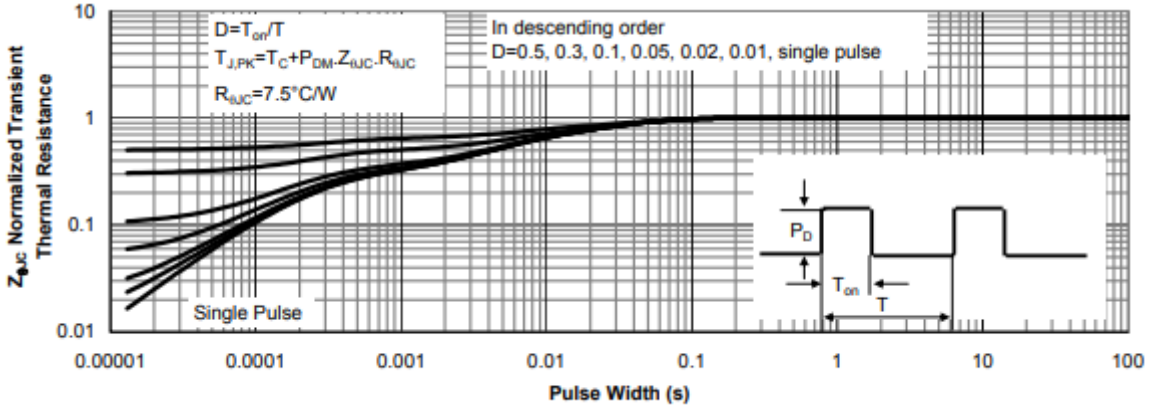
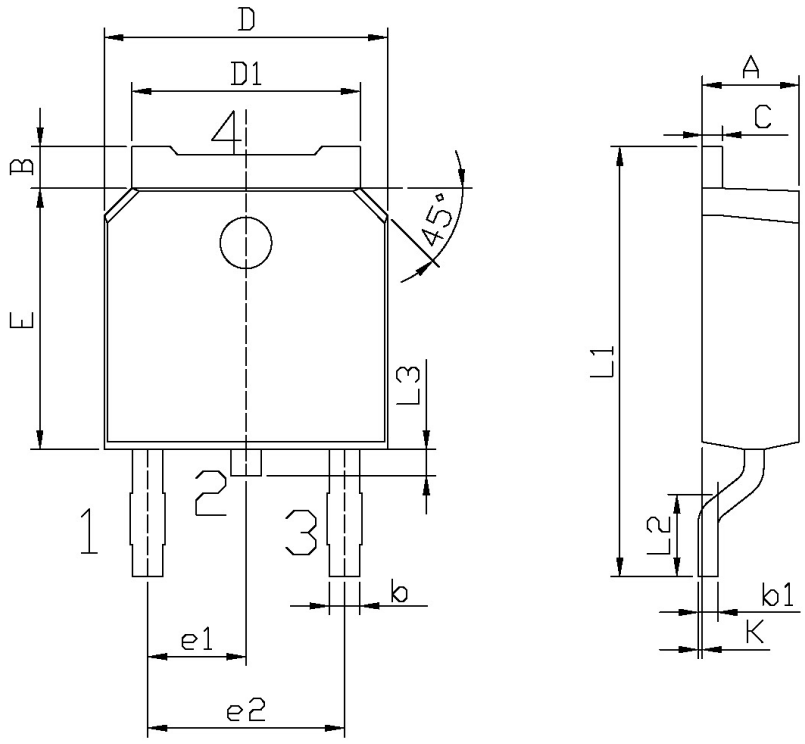


Figure 10 : Normalized Maximum Transient Thermal Impedance

外形尺寸图 / Package Dimensions

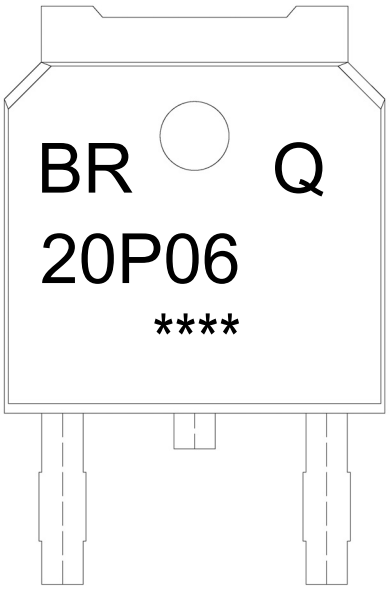


单位：mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	2.20	2.40	E	5.95	6.25
B	0.95	1.25	e1	2.24	2.34
b	0.70	0.90	e2	4.43	4.73
b1	0.45	0.55	L1	9.85	10.35
C	0.45	0.55	L2	1.25	1.75
D	6.45	6.75	L3	0.60	0.90
D1	5.10	5.50	K	0.00	0.10

TO-252

印章说明 / Marking Instructions



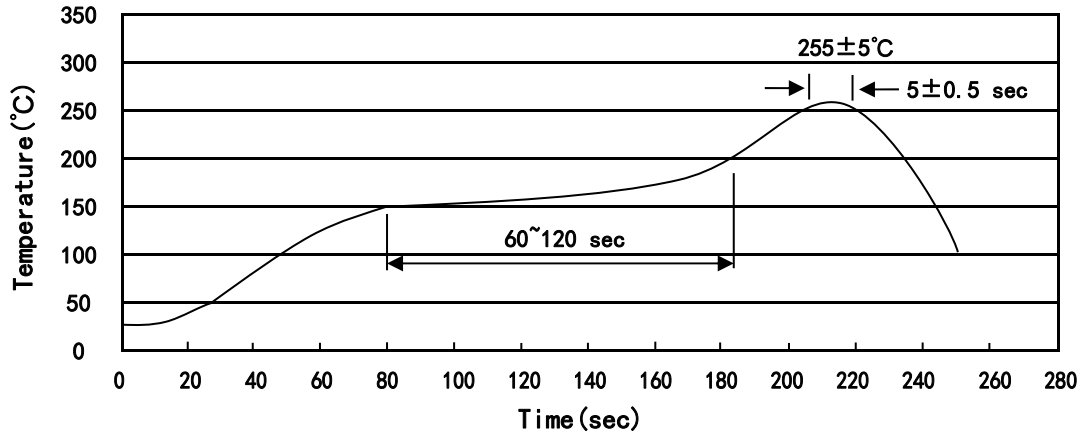
说明：

BR：	为公司代码
Q：	为汽车无卤产品标识
20P06：	为型号代码
****：	为生产批号代码，随生产批号变化。

Note:

BR:	Company Code
Q:	Automobile halogen-free product Code
20P06:	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：	Note:
1、预热温度 150～200℃，时间 60～120sec;	1.Preheating:150~200℃, Time:60~120sec.
2、峰值温度 255±5℃，时间持续为 5±0.5sec;	2.Peak Temp.:255±5℃, Duration:5±0.5sec.
3、焊接制程冷却速度为 2～10℃/sec.	3. Cooling Speed: 2~10℃/sec.

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

温度：260±5℃　　时间：10±1 sec.　　Temp.:260±5℃　　Time:10±1 sec

包装规格 / Packaging SPEC.

卷盘包装 / REEL

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit：mm³)		
	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-252	2,500	2	5,000	6	30,000	13″ ×16	360×360×50	380×335×366

套管包装 / TUBE

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit：mm³)		
	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