

BRCS60N02DP

Rev.A Apr.-2019

描述 / Descriptions

N 沟道 TO-252 塑封封装场效应管。

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

特征 / Features

$R_{DS(on)}$ 小, 门电荷低, C_{rss} 小, 开关速度快。无卤产品。

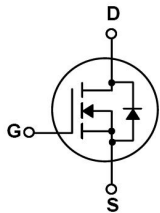
Low $R_{DS(on)}$, low gate charge, low C_{rss} , fast switching. Halogen-free Product.

用途 / Applications

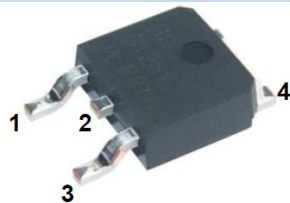
用于低压电路如: 汽车电路、DC/DC 转换、便携式产品的电源高效转换。

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}	20	V	
Drain Current	$I_D(Tc=25^{\circ}C)$	60	A	
	$I_D(Tc=100^{\circ}C)$	50	A	
Drain Current - Pulsed	I_{DM}	210	A	
Gate-Source Voltage	V_{GS}	± 12	V	
Avalanche Current	I_{AS}	18.3	A	
Avalanche energy L=0.5mH	E_{AS}	268	mJ	
Power Dissipation	$P_D(Tc=25^{\circ}C)$	100	W	
	$P_D(Tc=100^{\circ}C)$	50	W	
Junction and Storage Temperature Range	T_j, T_{stg}	-55~150	$^{\circ}C$	
Maximum Junction-to-Ambient	Steady-State	$R_{\theta JA}$	62	$^{\circ}C/W$
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	1.25	

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}	$V_{GS}=0V$ $I_D=250\mu A$	20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=20V$ $V_{GS}=0V$			1.0	μA
		$T_J=55^{\circ}C$			5.0	μA
Gate-Body Leakage Current Forward	I_{GSS}	$V_{GS}=\pm 12V$ $V_{DS}=0V$			± 0.1	μA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ $I_D=250\mu A$	0.3	0.6	1.0	V
Static Drain-Source On-Resistance	$R_{DS(on)1}$	$V_{GS}=10V$ $I_D=60A$		5.5	7	m Ω
	$R_{DS(on)2}$	$V_{GS}=4.5V$ $I_D=30A$		6	7	m Ω
	$R_{DS(on)3}$	$V_{GS}=2.5V$ $I_D=15A$		8	10	m Ω
Diode Forward Voltage	V_{SD}	$I_S=1A$ $V_{GS}=0V$		0.9	1.35	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}	$V_{DS}=25V$ $V_{GS}=0V$ $f=1.0MHz$		2380		pF
Output Capacitance	C_{oss}			65		
Reverse Transfer Capacitance	C_{rss}			165		
Gate resistance	R_g	$V_{GS}=0V$ $V_{DS}=0V$ $f=1MHz$		1.28		Ω
Total Gate Charge	$Q_g(4.5V)$	$V_{GS}=10V$ $V_{DS}=10V$ $I_D=20A$	28	36	43	nC
Gate Source Charge	Q_{gs}			9		
Gate Drain Charge	Q_{gd}			12		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=10V$ $V_{DS}=10V$ $R_L=0.5\Omega$ $R_{GEN}=3\Omega$		7		ns
Turn-On Rise Time	t_r			8		
Turn-Off Delay Time	$t_{d(off)}$			70		
Turn-Off Fall Time	t_f			18		
Body Diode Reverse Recovery Time	t_{rr}	$I_F=20A$ $dI/dt=500A/ms$	13	17	20	ns
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F=20A$ $dI/dt=500A/ms$	29	36	43	nC

电参数曲线图 / Electrical Characteristic Curve

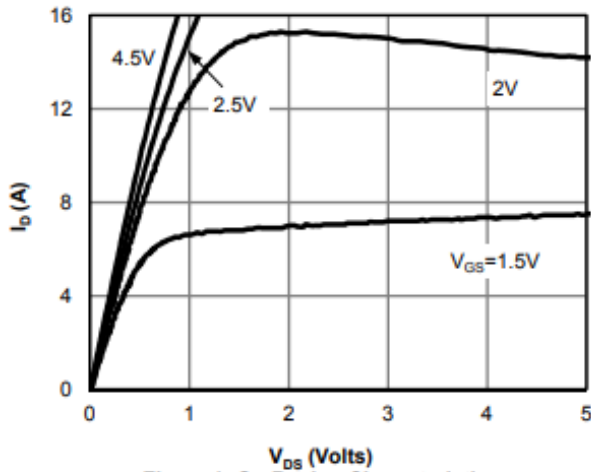


Figure 1: On-Region Characteristics

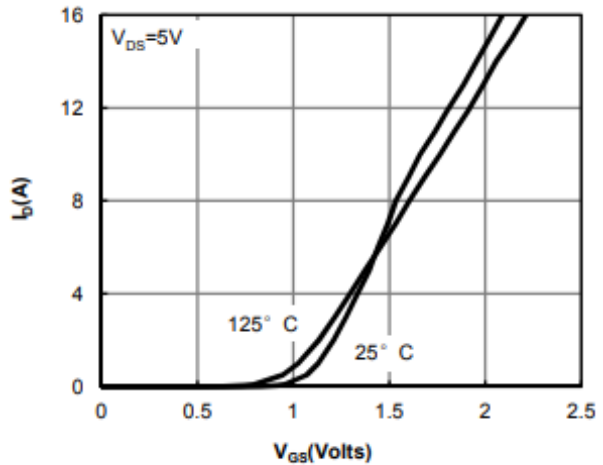


Figure 2: Transfer Characteristics

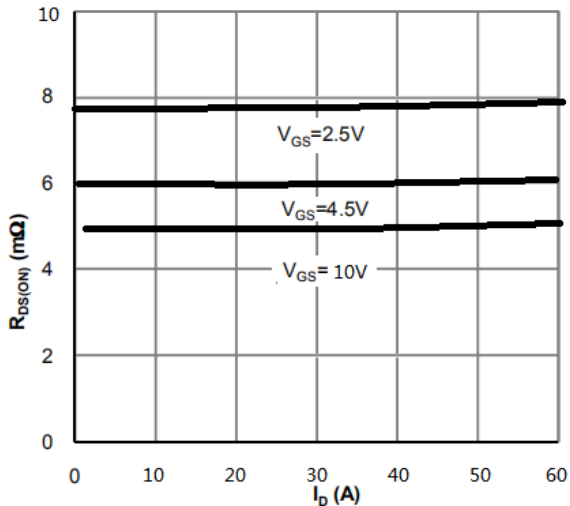


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

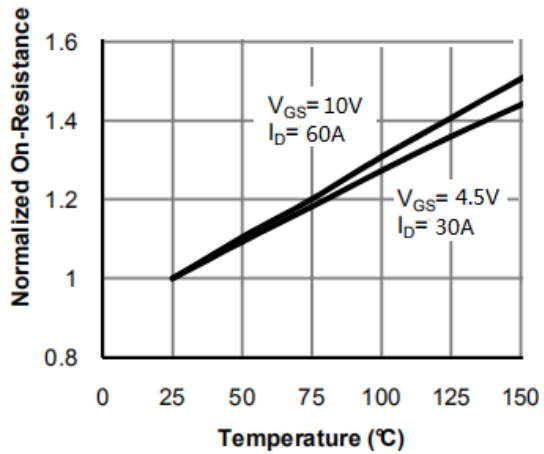


Figure 4: On-Resistance vs. Junction Temperature

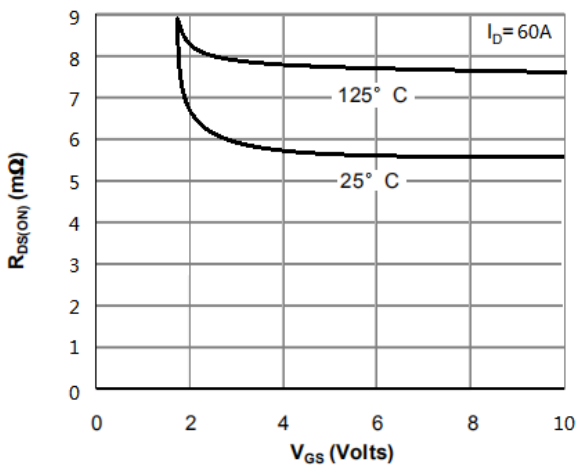


Figure 5: On-Resistance vs. Gate-Source Voltage

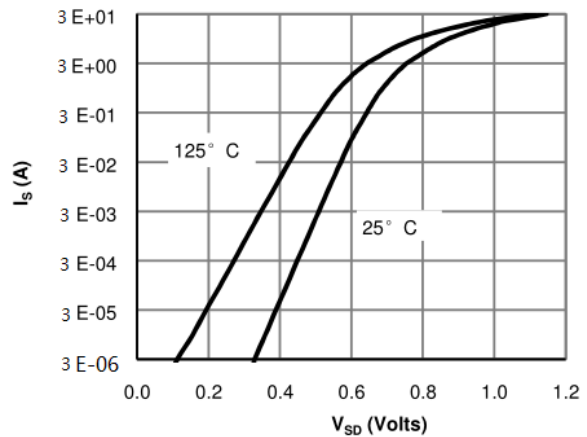


Figure 6: Body-Diode Characteristics

电参数曲线图 / Electrical Characteristic Curve

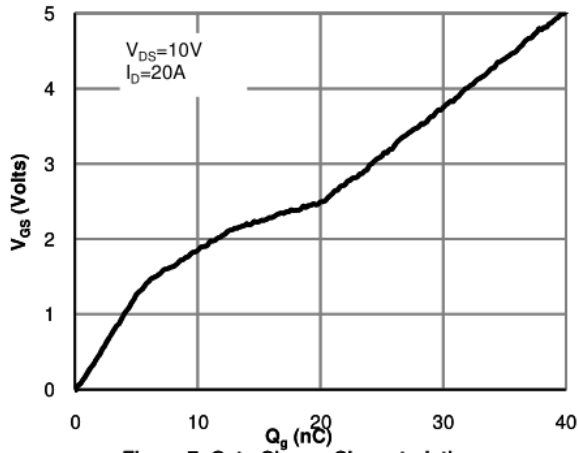


Figure 7: Gate-Charge Characteristics

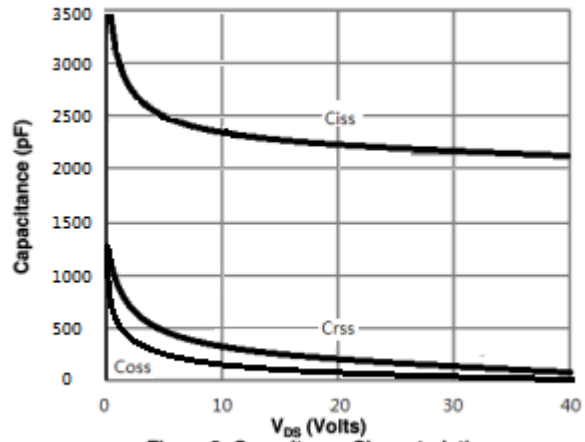


Figure 8: Capacitance Characteristics

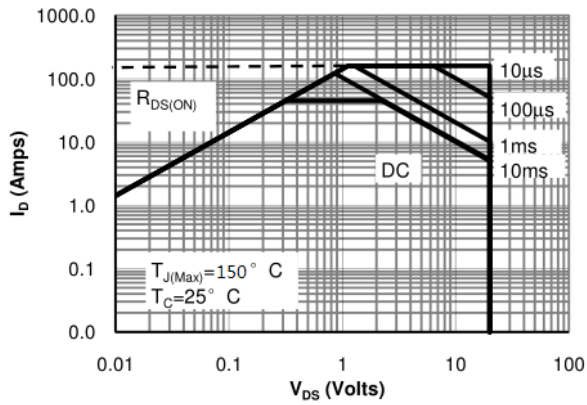


Figure 9: Maximum Forward Biased Safe Operating Area

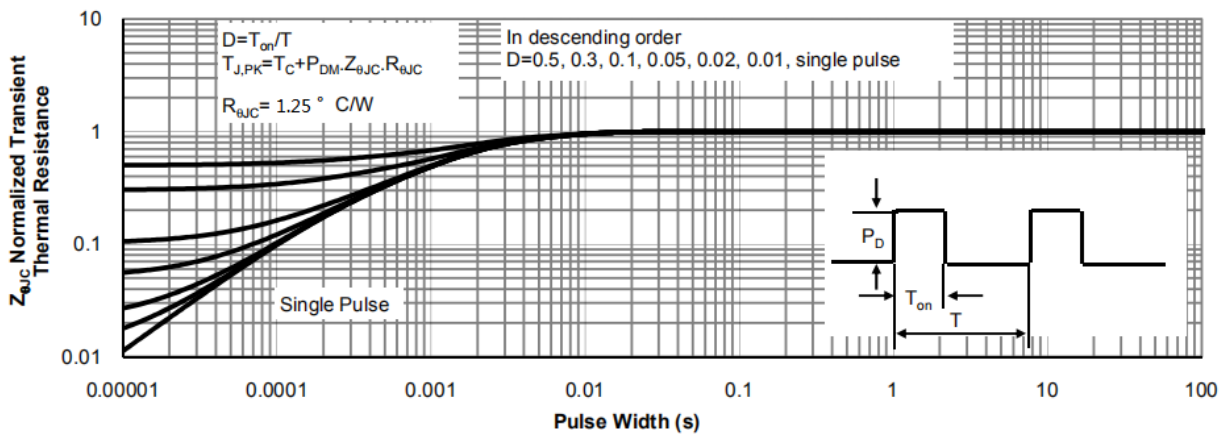
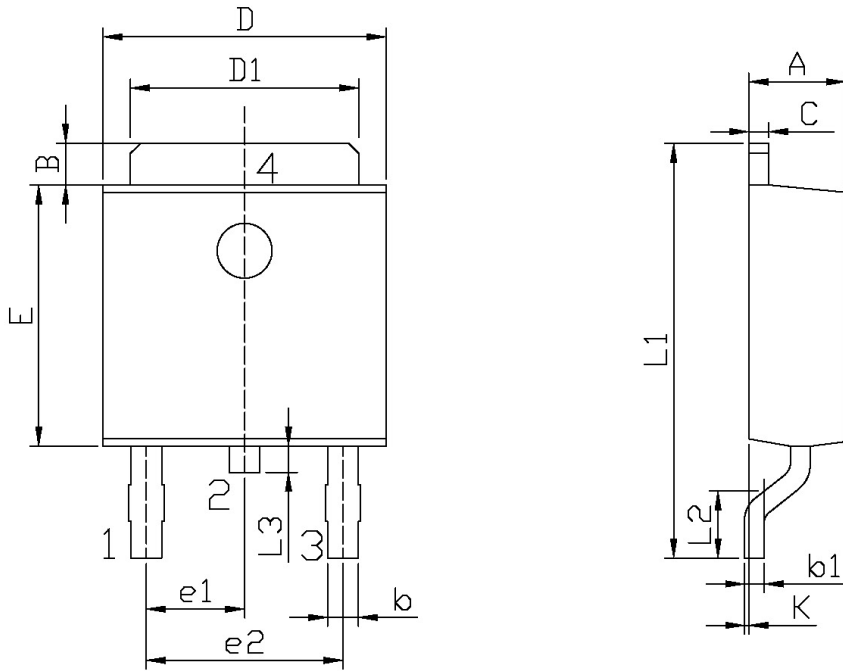


Figure 10: Normalized Maximum Transient Thermal Impedance

外形尺寸图 / Package Dimensions

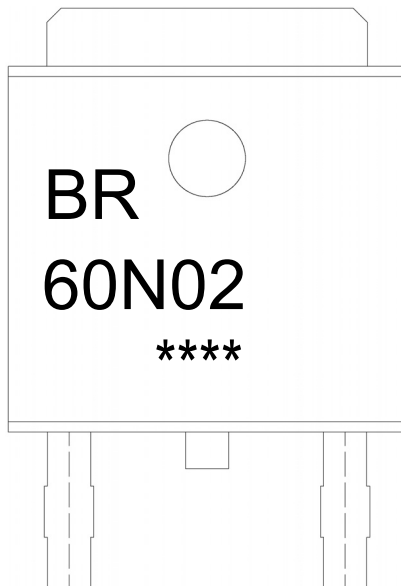


单位: mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	2.20	2.40	E	5.95	6.25
B	0.95	1.25	e1	2.24	2.34
b	0.50	0.70	e2	4.43	4.73
b1	0.45	0.55	L1	9.45	9.95
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

60N02： 为型号代码

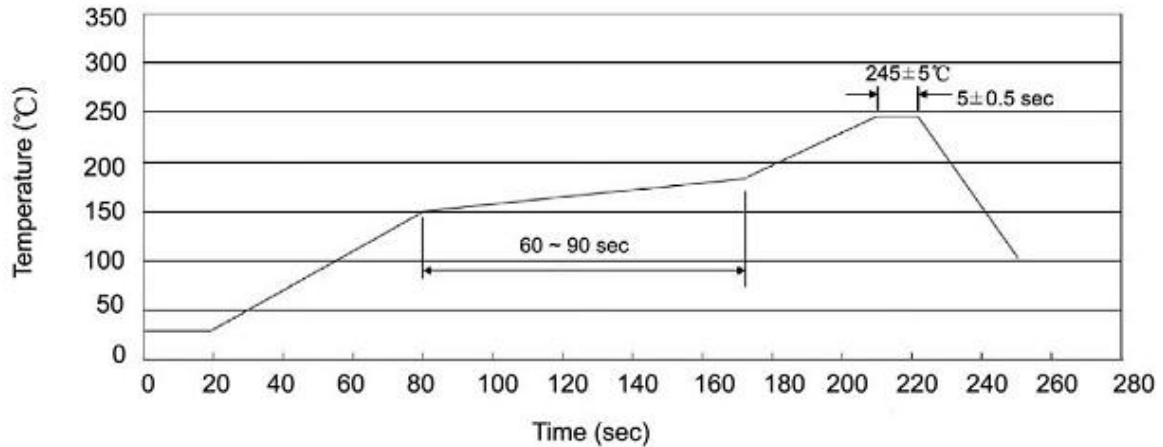
****： 为生产批号代码，随生产批号变化。

Note:

BR: Company Code

60N02: 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 150~180°C，时间 60~90sec；
- 2、峰值温度 245±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:150~180°C, Time:60~90sec.
- 2.Peak Temp.:245±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：260±5°C

时间：10±1 sec.

Temp.:260±5°C

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: 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-252	2,500	2	5,000	5	25,000	13" × 16	360×360×50	385×257×392

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

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