

描述 / Descriptions

TO-252 塑封封装 N 沟道 MOS 场效应管。N-CHANNEL MOSFET in a TO-252 Plastic Package.

特征 / Features

$V_{DS} (V) = 60V$

$I_D = 12 A$

$R_{DS(ON)} < 60 m\Omega (V_{GS} = 10V)$

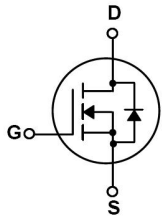
$R_{DS(ON)} < 85 m\Omega (V_{GS} = 4.5V)$

用途 / Applications

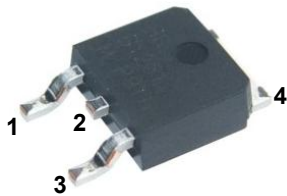
用于 PWM,负载开关和通用应用。

This device is suitable for use in PWM, load switching and general purpose 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

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}	60	V
Drain Current ^G	$I_D(T_C=25^{\circ}C)$	12	A
	$I_D(T_C=100^{\circ}C)$	12	A
Pulsed Drain Current ^C	I_{DM}	30	A
Gate-Source Voltage ^C	V_{GSS}	±20	V
Avalanche Current	I_{AR}	12	A
Repetitive Avalanche Energy ^C	E_{AR}	23	mJ
Total Power Dissipation ^B	$P_D(T_C=25^{\circ}C)$	20	W
	$P_D(T_C=100^{\circ}C)$	10	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 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
Zero Gate Voltage Drain Current	BV_{DSS}	$V_{GS}=0V$ $I_D=10mA$	60			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=48V$ $V_{GS}=0V$			1.0	μA
		$V_{DS}=48V$ $T_J=55^{\circ}C$			5.0	μA
Gate-Body Leakage Current Forward	I_{GSS}	$V_{GS}=\pm 20V$ $V_{DS}=0V$			0.1	μA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ $I_D=250\mu A$	1.0		3.0	V
On state drain current	$I_{D(ON)}$	$V_{GS}=10V$, $V_{DS}=5V$	30			A
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V$ $I_D=12A$		47	60	mΩ
		$V_{GS}=10V$ $I_D=12A$ $T_J=125^{\circ}C$		85		
		$V_{GS}=4.5V$, $I_D=6A$		67	85	
Forward Transconductance	g_{FS}	$V_{DS}=5V$ $I_D=12A$		14		S
Forward On Voltage	V_{SD}	$V_{GS}=0V$ $I_S=1.0A$		0.74	1	V
Maximum Body-Diode Continuous Current	I_S				12	A

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}	$V_{DS}=30V$ $V_{GS}=0V$ $f=1.0MHz$		450	540	pF
Output Capacitance	C_{oss}			61		
Reverse Transfer Capacitance	C_{rss}			27		
Gate resistance	R_g	$V_{GS}=0V,$ $V_{DS}=0V,$ $f=1MHz$		1.35	2	Ω
Total Gate Charge	$Q_g(10V)$	$V_{GS}=10V,$ $V_{DS}=30V,$ $I_D=12A$		7.5	1.0	nC
Total Gate Charge	$Q_g(4.5V)$			3.8	5	
Gate Source Charge	Q_{gs}			1.2		
Gate Drain Charge	Q_{gd}			1.9		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=10V,$ $V_{DS}=30V,$ $R_L=2.5\Omega,$ $R_{GEN}=3\Omega$		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}	$I_F=12A, di/dt=100A/\mu s$		27.6	35	ns
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F=12A, di/dt=100A/\mu s$		30		nC
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	$t \leq 10s$		17.4	30	$^{\circ}C/W$
Maximum Junction-to-Ambient ^A		Steady-State		50	60	
Maximum Junction-to-Case ^B	$R_{\theta JC}$	Steady-State		4	7.5	

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}C$. The

Power dissipation PDSM is based on $R_{\theta JA}$ and the maximum allowed junction temperature of $150^{\circ}C$. The value in any a given application depends on the user's specific board design, and the maximum temperature fo $150^{\circ}C$ may be used if the PCB allows it.

B. The power dissipation PD is based on $T_J(MAX)=150^{\circ}C$, 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 $T_J(MAX)=150^{\circ}C$.

D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using $<300\mu s$ 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 $T_J(MAX)=150^{\circ}C$.

G. The maximum current rating is limited by bond-wires.

H. These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}C$. The SOA curve provides a single pulse rat

电参数曲线图 / Electrical Characteristic Curve

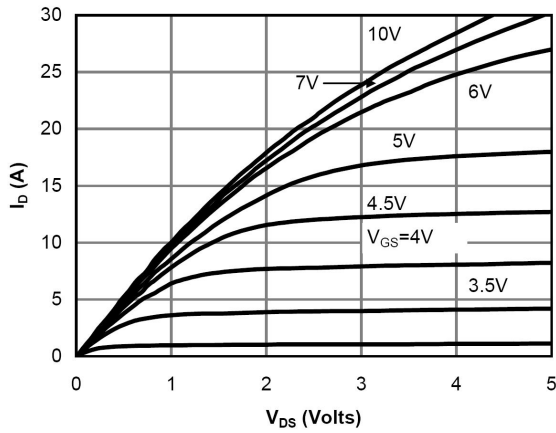


Fig 1: On-Region Characteristics

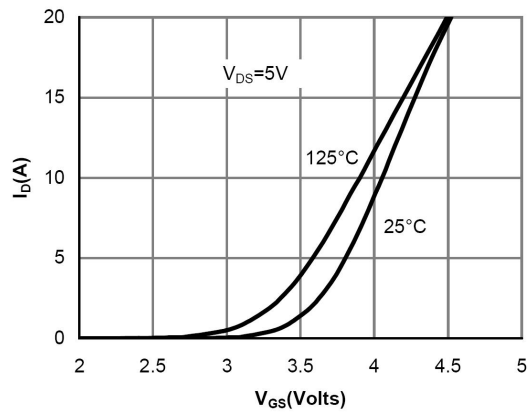


Figure 2: Transfer Characteristics

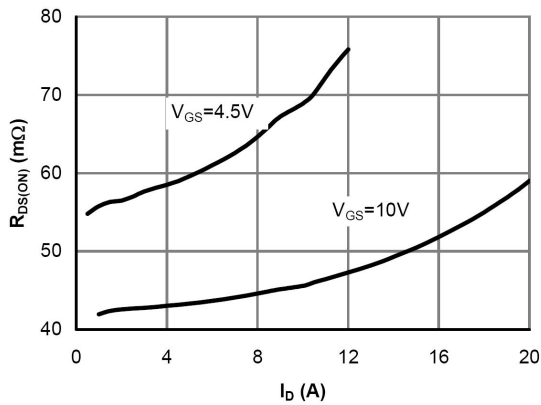


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

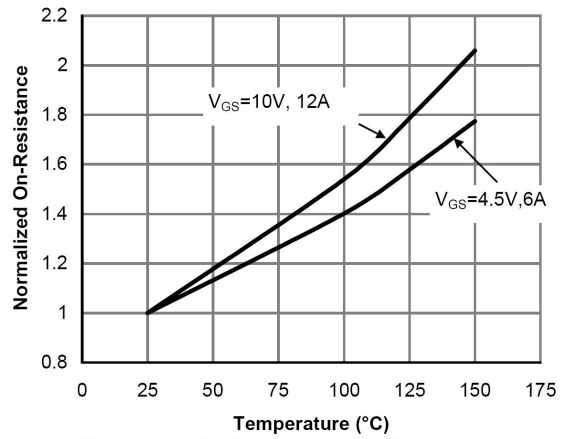


Figure 4: On-Resistance vs. Junction Temperature

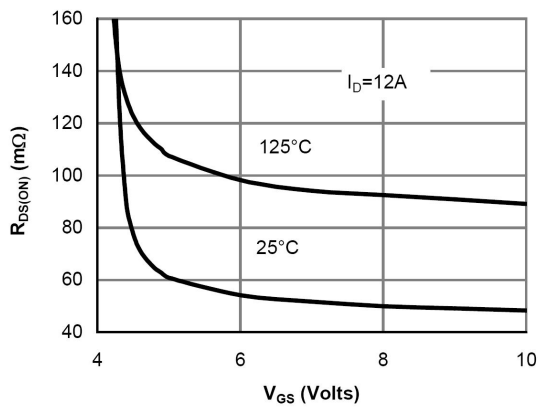


Figure 5: On-Resistance vs. Gate-Source Voltage

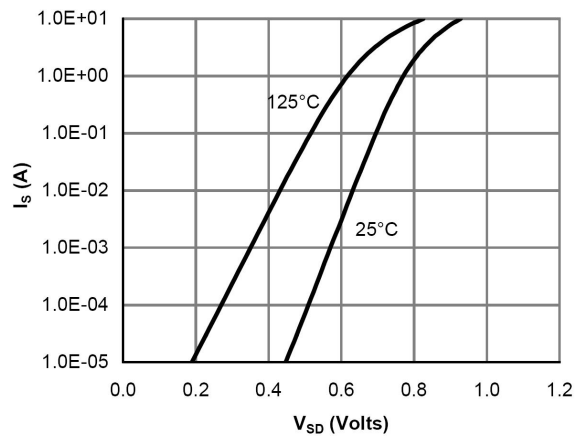


Figure 6: Body-Diode Characteristics

电参数曲线图 / Electrical Characteristic Curve

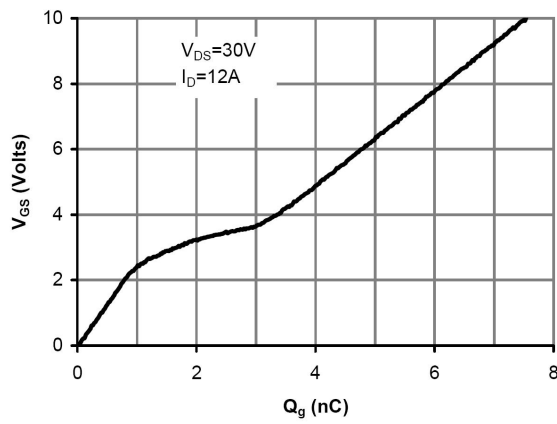


Figure 7: Gate-Charge Characteristics

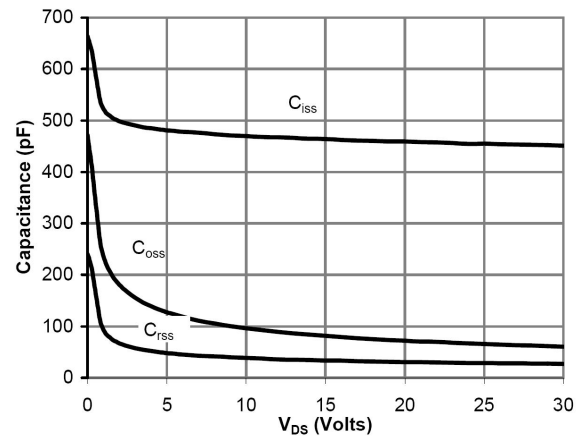


Figure 8: Capacitance Characteristics

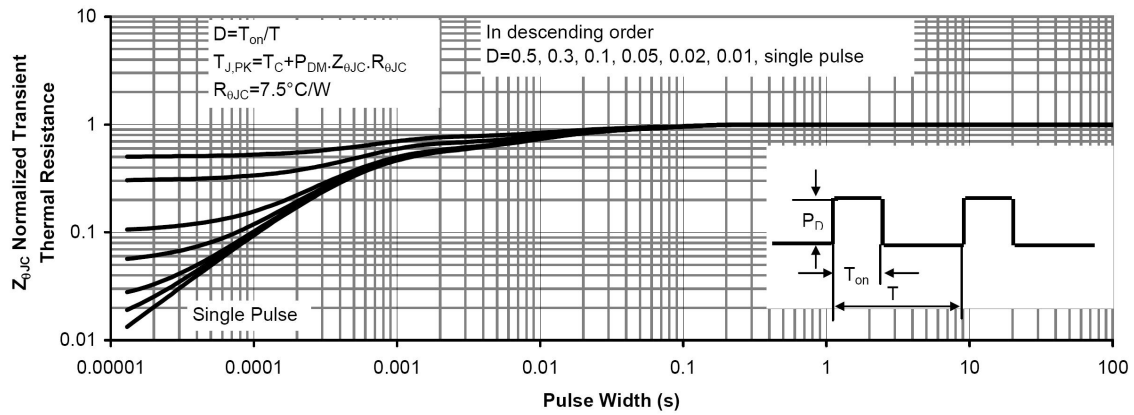
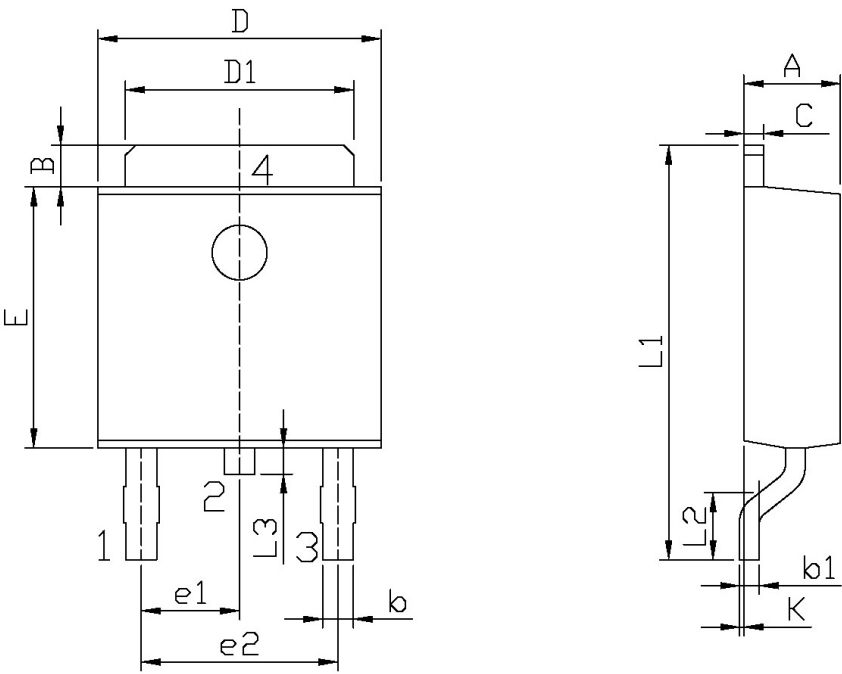


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

外形尺寸图 / Package Dimensions

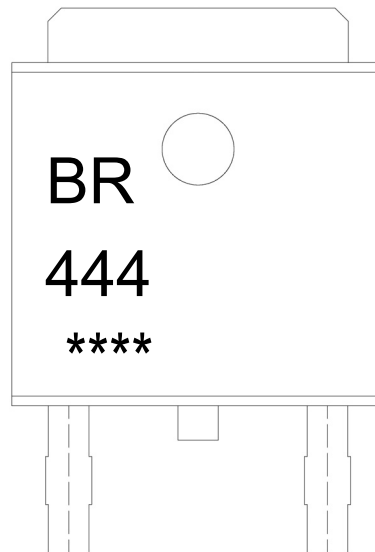


单位: mm

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

T0-252

印章说明 / Marking Instructions



说明：

BR： 为公司代码

444： 为产品型号

****： 为生产批号代码，随生产批号变化。

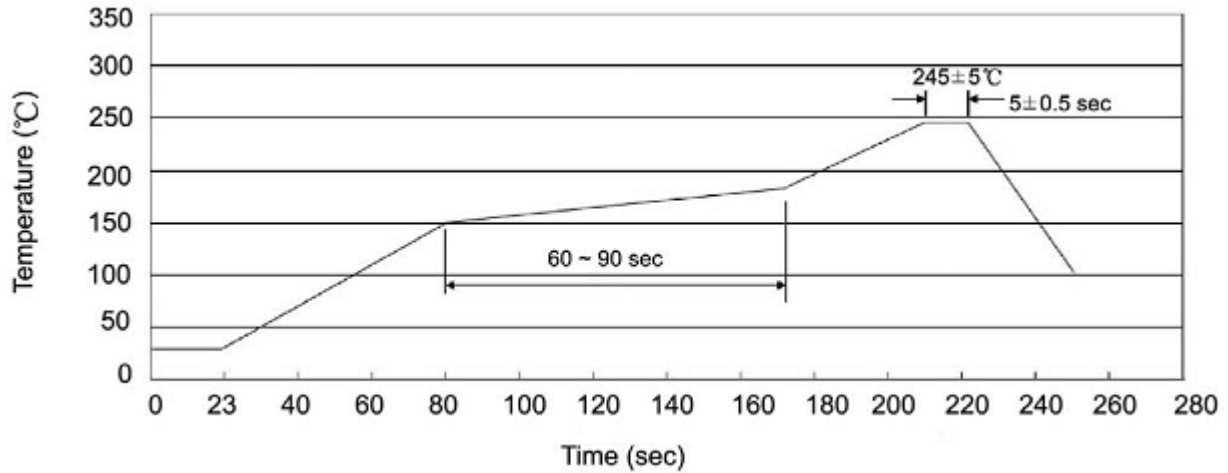
Note:

BR: Company Code

444: Product Type

****: 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 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:25~150°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	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: 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