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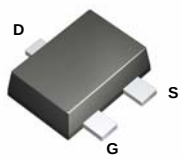
January 2015

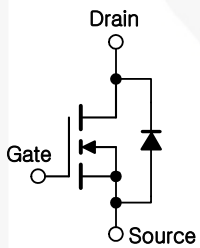
2N7002T
N-Channel Enhancement Mode Field Effect Transistor

Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface Mount Package
- Lead Free/RoHS Compliant



SOT - 523F



Ordering Information

Part Number	Top Mark	Package	Packing Method
2N7002T	AA	SOT-523F 3L	Tape and Reel

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter		Value	Unit
V_{DSS}	Drain-Source Voltage		60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} ≤ 1.0 MΩ)		60	V
V_{GSS}	Gate-Source Voltage	Continuous	±20	V
		Pulsed	±40	
I_D	Drain Current	Continuous	115	mA
		Continuous at 100°C	73	
		Pulsed	800	
T_J	Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to +150	°C

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Thermal Characteristics

Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Value	Unit
P_D	Total Device Dissipation	200	mW
	Derate Above T_A = 25°C	1.6	mW/°C
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient(1)	625	°C/W

Note:

1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch. Minimum land pad size.

Electrical Characteristics

Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics(2)						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 10 µA	60	78		V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60 V, V_{GS} = 0 V		0.001	1.0	µA
		V_{DS} = 60 V, V_{GS} = 0 V, T_J = 125°C		7	500	
I_{GSS}	Gate-Body Leakage	V_{GS} = ±20 V, V_{DS} = 0 V		0.2	±10	nA
On Characteristics(2)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 µA	1.00	1.76	2.00	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 5 V, I_D = 0.05 A		1.6	7.5	Ω
		V_{GS} = 10 V, I_D = 0.5 A			2.0	
		V_{GS} = 10 V, I_D = 0.5 A, T_J = 125°C		2.53	13.5	
$I_{D(ON)}$	On-State Drain Current	V_{GS} = 10 V, V_{DS} = 7.5 V	0.50	1.43		A
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 0.2 A	80.0	356.5		mS
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS}= 0 V, f = 1.0 MHz		37.8	50	pF
C_{oss}	Output Capacitance			12.4	25	pF
C_{rss}	Reverse Transfer Capacitance			6.5	7	pF
Switching Characteristics						
$t_{D(ON)}$	Turn-On Delay Time	V_{DD} = 30 V, I_D = 0.2 A, V_{GEN} = 10 V, R_L = 150 Ω, R_{GEN} = 25 Ω		5.85	20	ns
$t_{D(OFF)}$	Turn-Off Delay Time			12.5	20	ns

Note:

2. Short duration test pulse used to minimize self-heating effect.

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Typical Performance Characteristics

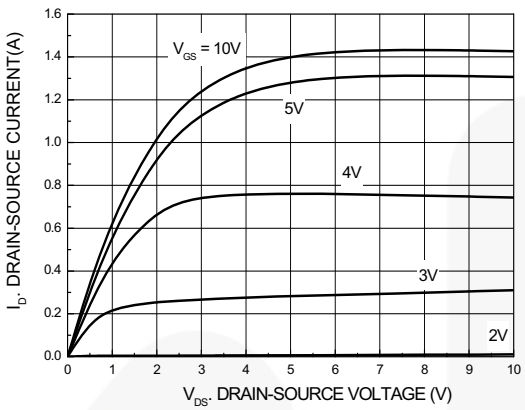

Figure 1. On-Region Characteristics

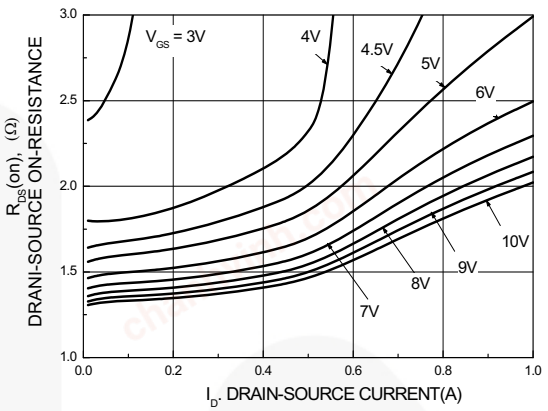

Figure 2. On-Resistance Variation with Gate Voltage and Drain Current

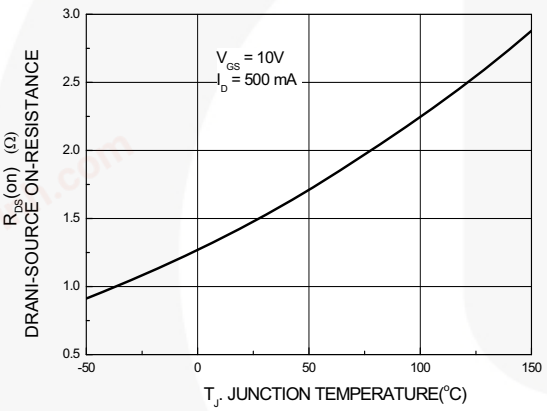

Figure 3. On-Resistance Variation with Temperature

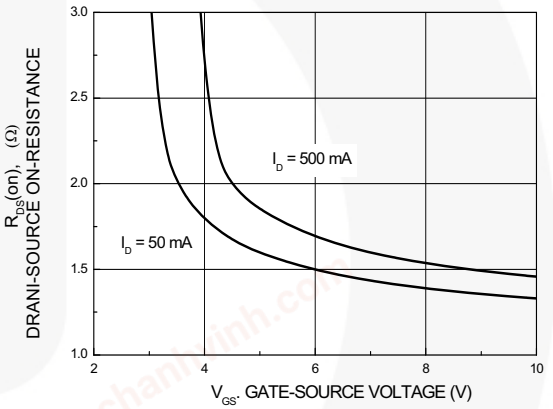

Figure 4. On-Resistance Variation with Gate-Source Voltage

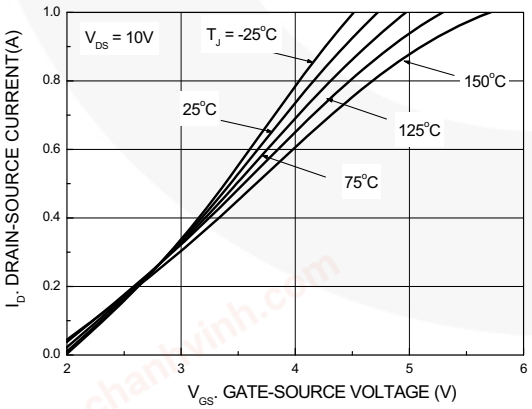

Figure 5. Transfer Characteristics

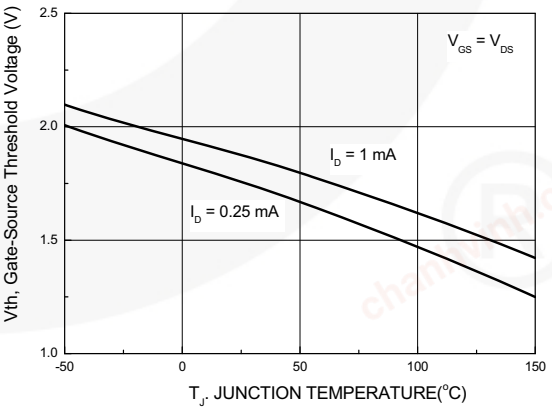

Figure 6. Gate Threshold Variation with Temperature

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Typical Performance Characteristics (Continued)

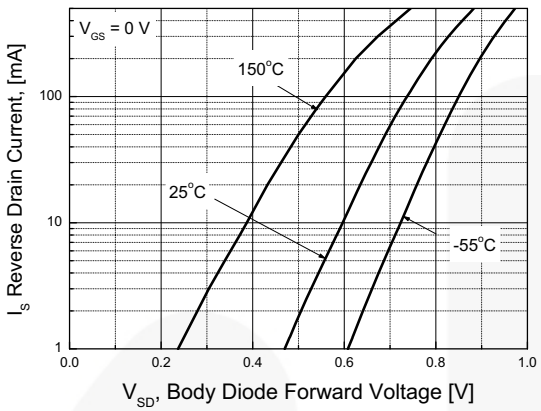

Figure 7. Reverse Drain Current Variation with Diode Forward Voltage and Temperature

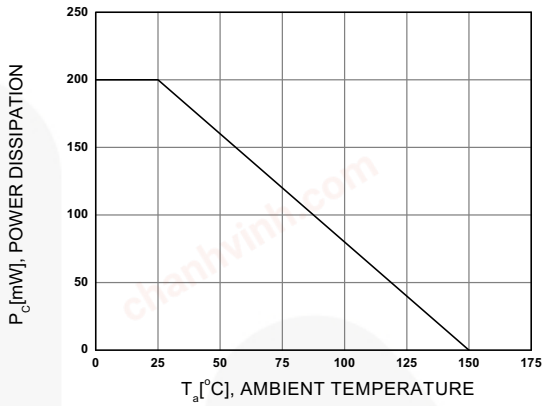

Figure 8. Power Derating

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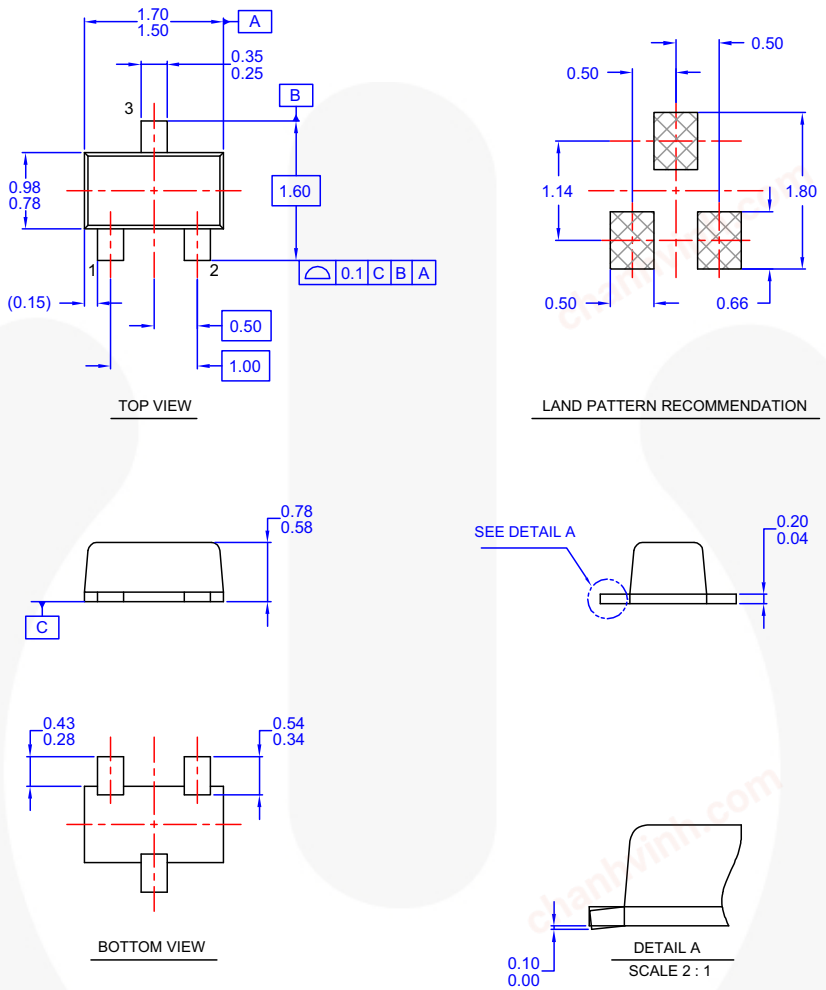
Physical Dimensions



NOTES:
A) THIS PACKAGE CONFORMS TO EIAJ SC89 PACKAGING STANDARD.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DRAWING CONFORMS TO ASME Y14.5M-1994
D) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

MAD03ArevA

Figure 9. 3-LEAD, SC89, EIAJ-SC89, 0.88MM WIDE, SOT523F

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