



CHENMKO ENTERPRISE CO.,LTD

2N7002DSGP

Halogens free devices

SURFACE MOUNT
Dual N-Channel Enhancement MOS FET
VOLTAGE 50 Volts CURRENT 0.51 Ampere

APPLICATION

- * Servo motor control.
- * Power MOSFET gate drivers.
- * Other switching applications.

FEATURE

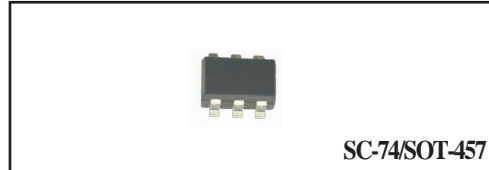
- * Small surface mounting type. (SC-74/SOT-457)
- * High density cell design for low $R_{DS(ON)}$.
- * Suitable for high packing density.
- * Rugged and reliable.
- * High saturation current capability.
- * Voltage controlled small signal switch.

CONSTRUCTION

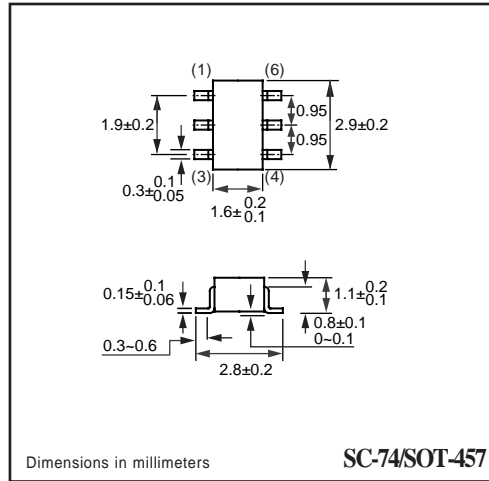
- * Dual N-Channel Enhancement

MARKING

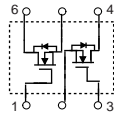
- * 72D



SC-74/SOT-457



CIRCUIT



Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	2N7002DSGP	Units
V_{DSS}	Drain-Source Voltage	50	V
V_{DGR}	Drain-Gate Voltage ($R_{GS} \leq 1 \text{ M}\Omega$)	50	V
V_{GSS}	Gate-Source Voltage - Continuous	± 20	V
I_D	Maximum Drain Current - Continuous - Pulsed	$T_A = 25^\circ\text{C}$	510
		$T_A = 70^\circ\text{C}$	1500
P_D	Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	960
		$T_A = 70^\circ\text{C}$	900
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering Purposes, 1/16" from Case for 10 Seconds	300	$^\circ\text{C}$

Thermal characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	130	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	60	$^\circ\text{C/W}$

RATING CHARACTERISTIC CURVES (2N7002DSGP)

Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
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OFF CHARACTERISTICS

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	50			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}$			1	μA
					0.5	mA
I_{GSSF}	Gate - Body Leakage, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
I_{GSSR}	Gate - Body Leakage, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA

ON CHARACTERISTICS (Note 1)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1	1.9	2.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 510\text{ mA}$		1	2	Ω
					1.6	
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 10\text{ V}, V_{DS} = 10\text{ V}$	1500			mA
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 510\text{ mA}$		400		mS

DYNAMIC CHARACTERISTICS

Q_g	Total Gate Charge	$V_{DS} = 25\text{ V}, V_{GS} = 10\text{ V}, I_D = 510\text{ mA}$		1		nC
Q_{gs}	Gate-Source Charge			0.19		
Q_{gd}	Gate-Drain Charge			0.33		
C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$		20		pF
C_{oss}	Output Capacitance			13		
C_{rss}	Reverse Transfer Capacitance			5		
t_{on}	Turn-On Time	$V_{DD} = 25\text{ V}, I_D = 250\text{ mA}, V_{GS} = 10\text{ V}, R_{GEN} = 25\ \Omega$		6	20	nS
t_r				6	20	
t_{off}	Turn-Off Time	$V_{DD} = 25\text{ V}, I_D = 250\text{ mA}, V_{GS} = 10\text{ V}, R_{GEN} = 25\ \Omega$		11	20	nS
t_f				5	20	

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS

I_S	Maximum Continuous Drain-Source Diode Forward Current			510	mA	
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current			1.5	A	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 200\text{ mA}$ (Note 1)		0.8	1.2	V

Note:

1. Pulse Test: Pulse Width < 300 μs , Duty Cycle < 2.0%.

RATING CHARACTERISTIC CURVES (2N7002DSGP)

Typical Electrical Characteristics

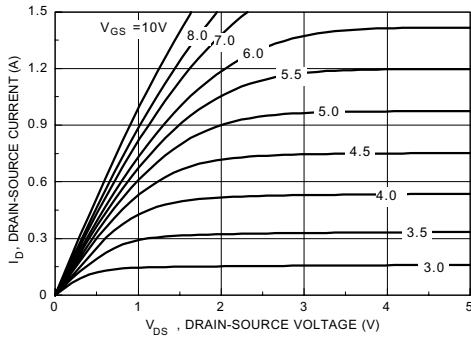


Figure 1. On-Region Characteristics.

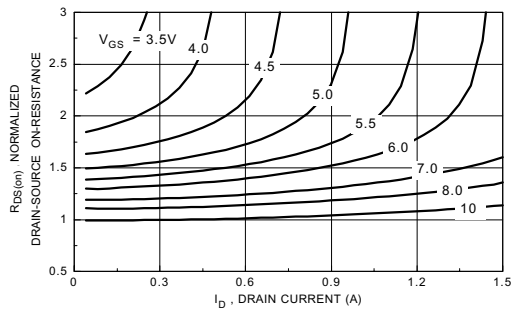


Figure 2. On-Resistance Variation with Gate Voltage and Drain Current.

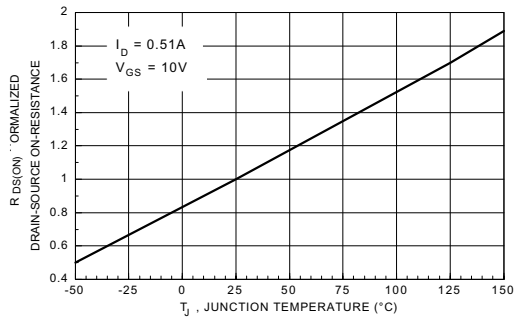


Figure 3. On-Resistance Variation with Temperature.

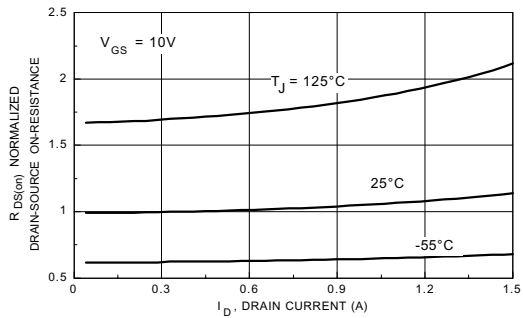


Figure 4. On-Resistance Variation with Drain Current and Temperature.

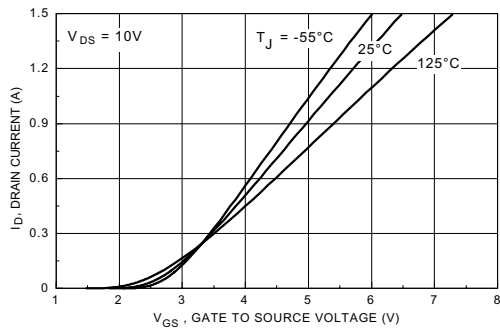


Figure 5. Transfer Characteristics.

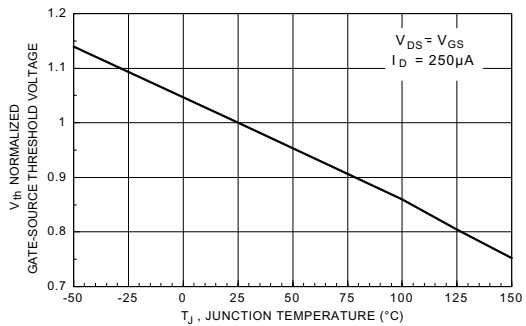


Figure 6. Gate Threshold Variation with Temperature.

RATING CHARACTERISTIC CURVES (2N7002DSGP)

Typical Electrical Characteristics (continued)

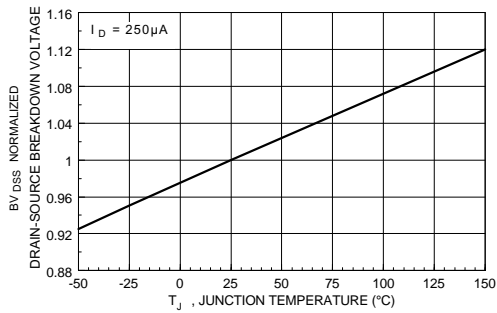


Figure 7. Breakdown Voltage Variation with Temperature.

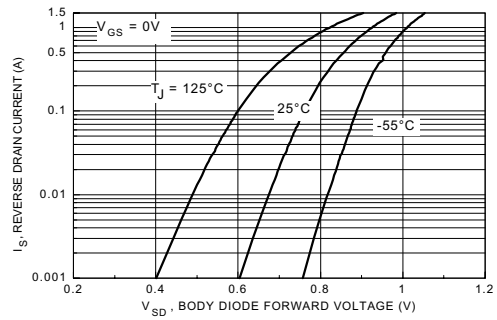


Figure 8. Body Diode Forward Voltage Variation with Current and Temperature.

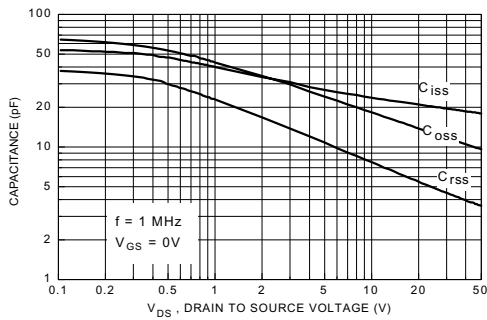


Figure 9. Capacitance Characteristics.

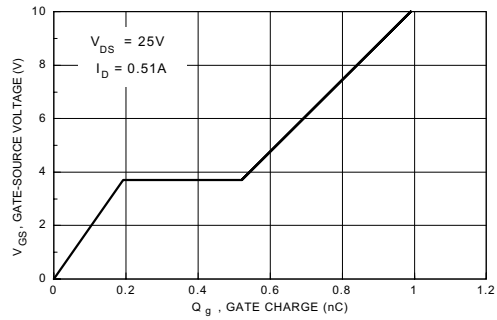


Figure 10. Gate Charge Characteristics.

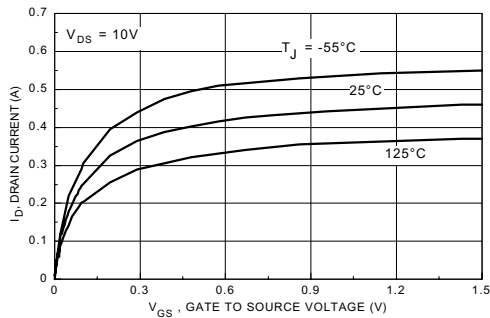


Figure 11. Transconductance Variation with Drain Current and Temperature.

RATING CHARACTERISTIC CURVES (2N7002DSGP)

Typical Thermal Characteristics

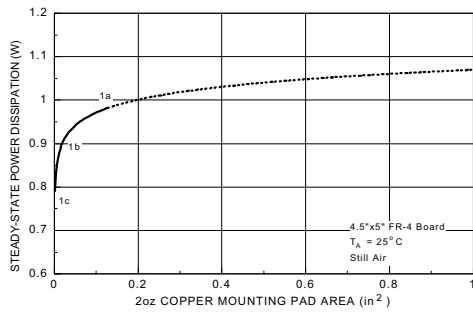


Figure 12. SOT-6 Dual Package Maximum Steady-State Power Dissipation versus Copper Mounting Pad Area.

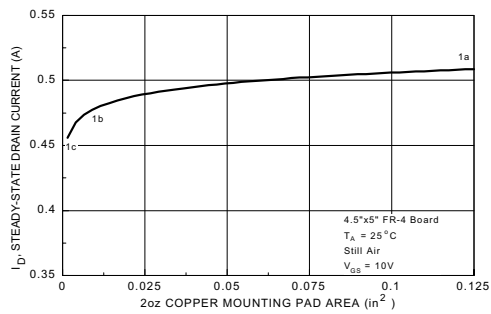


Figure 13. Maximum Steady-State Drain Current versus Copper Mounting Pad Area.

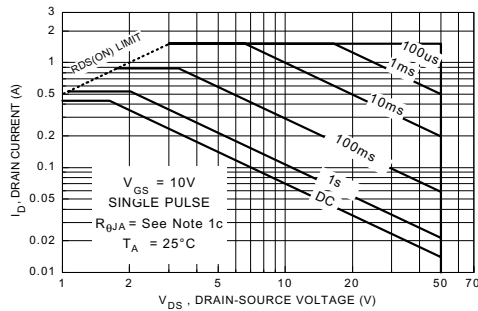


Figure 14. Maximum Safe Operating Area.

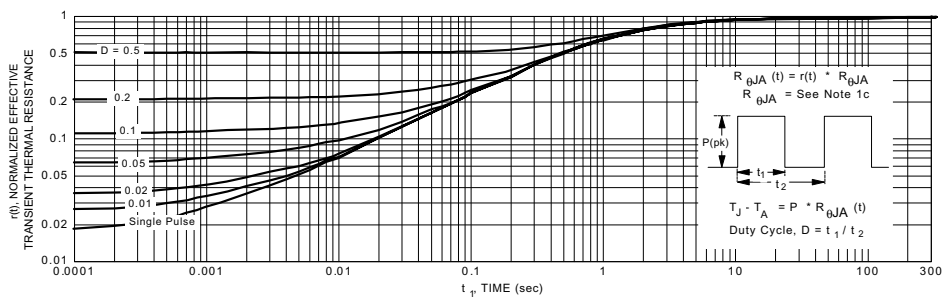


Figure 15. Transient Thermal Response Curve.

Note: Thermal characterization performed using the conditions described in note 1c. Transient thermal response will change depending on the circuit board design.