CHENMKO ENTERPRISE CO.,LTD

2N7002DSPT

SURFACE MOUNT
Dual N-Channel Enhancement MOS FET

VOLTAGE 50 Volts CURRENT 0.51 Ampere

Lead free devices

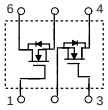
APPLICATION
* Servo motor control.
* Power MOSFET gate drivers.
* Other switching applications.

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.

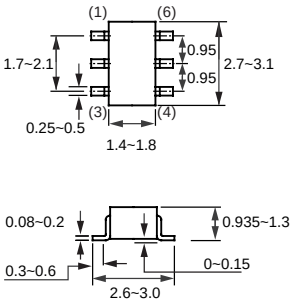
CONSTRUCTION
* Dual N-Channel Enhancement

MARKING
* 72DS

CIRCUIT



SC-74/SOT-457



Dimensions in millimeters

SC-74/SOT-457

Absolute Maximum Ratings

T_A = 25°C unless otherwise noted

Symbol	Parameter		2N7002DSPT	Units
V_{DSS}	Drain-Source Voltage		50	V
V_{DGR}	Drain-Gate Voltage (R_{GS} ≤ 1 MΩ)		50	V
V_{GSS}	Gate-Source Voltage - Continuous		±20	V
I_D	Maximum Drain Current - Continuous	TA= 25°C	510	mA
	- Pulsed	TA= 70°C	1500	
P_D	Maximum Power Dissipation	TA= 25°C	960	mW
		TA= 70°C	900	mW
T_J,T_{STG}	Operating and Storage Temperature Range		-55 to 150	°C
T_L	Maximum Lead Temperature for Soldering Purposes, 1/16" from Case for 10 Seconds		300	°C

Thermal characteristics

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

2004-7

RATING CHARACTERISTIC CURVES (2N7002DSPT)

Electrical Characteristics T_A = 25°C unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 µA	50			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 40 V, V_{GS} = 0 V			1	µA
		T_C=125°C			0.5	mA
I_{GSSF}	Gate - Body Leakage, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate - Body Leakage, Reverse	V_{GS} = -20 V, V_{DS} = 0 V			-100	nA
ON CHARACTERISTICS (Note 1)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 µA	1	1.9	2.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 510 m A		1	2	Ω
		V_{GS} = 4.5 V, I_D = 350 mA		1.6	4.0	
$I_{D(ON)}$	On-State Drain Current	V_{GS} = 10 V, V_{DS} = 10V	1500			mA
g_{FS}	Forward Transconductance	V_{DS} = 10 V , I_D = 510 mA		400		mS
DYNAMIC CHARACTERISTICS						
Q_g	Total Gate Charge	V_{DS} = 25 V, V_{GS} = 10 V, I_D = 510 mA		1		nC
Q_{gs}	Gate-Source Charge			0.19		
Q_{gd}	Gate-Drain Charge			0.33		
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz		20		pF
C_{oss}	Output Capacitance			13		
C_{rss}	Reverse Transfer Capacitance			5		
t_{on}	Turn-On Time	V_{DD} = 25V, I_D = 250 mA, V_{GS} = 10 V, R_{GEN} = 25 Ω		6	20	nS
t_r				6	20	
t_{off}	Turn-Off Time	V_{DD} = 25 V, I_D = 250 mA, V_{GS} = 10 V, R_{GEN} = 25 Ω		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 V, I_S = 200 mA (Note 1)		0.8	1.2	V

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

RATING CHARACTERISTIC CURVES (2N7002DSPT)

Typical Electrical Characteristics

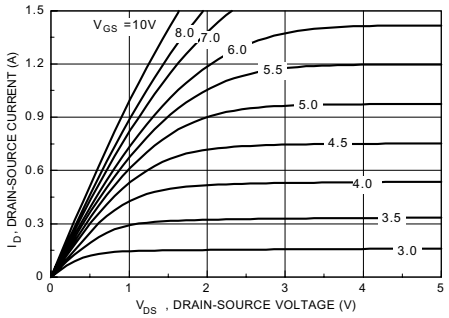


Figure 1. On-Region Characteristics.

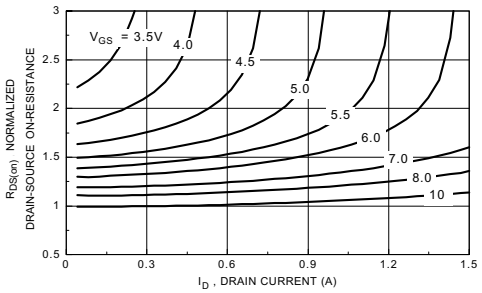


Figure 2. On-Resistance Variation with Gate Voltage and Drain Current.

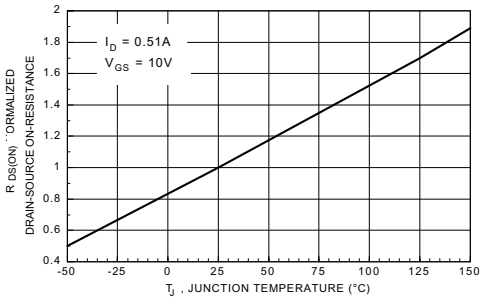


Figure 3. On-Resistance Variation with Temperature.

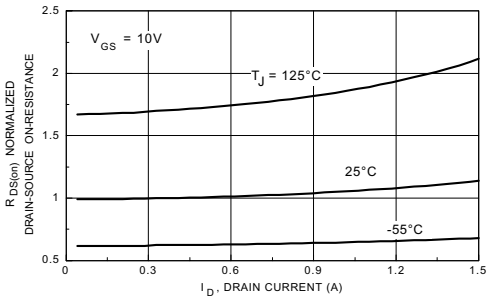


Figure 4. On-Resistance Variation with Drain Current and Temperature.

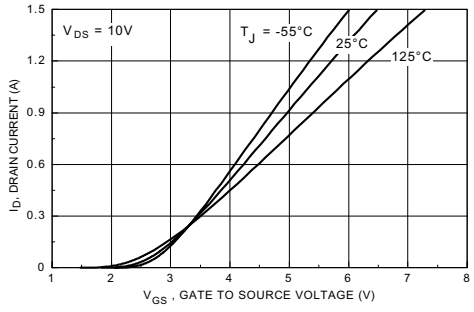


Figure 5. Transfer Characteristics.

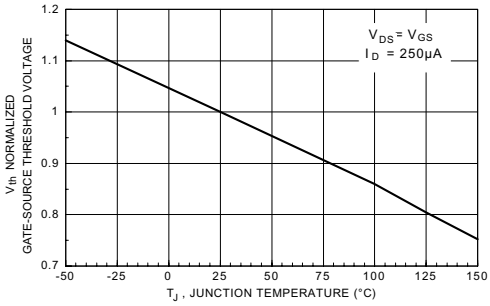


Figure 6. Gate Threshold Variation with Temperature.

RATING CHARACTERISTIC CURVES (2N7002DSPT)

Typical Electrical Characteristics (continued)

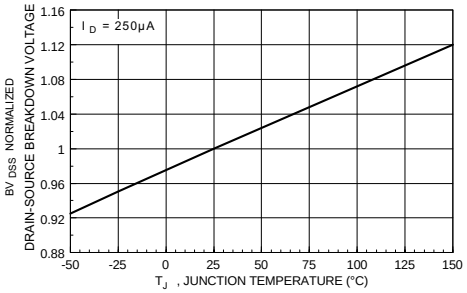


Figure 7. Breakdown Voltage Variation with Temperature.

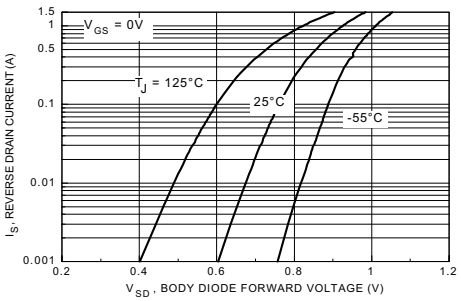


Figure 8. Body Diode Forward Voltage Variation with Current and Temperature.

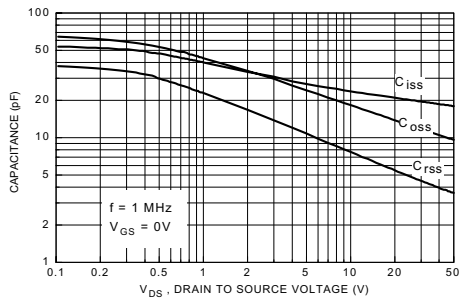


Figure 9. Capacitance Characteristics.

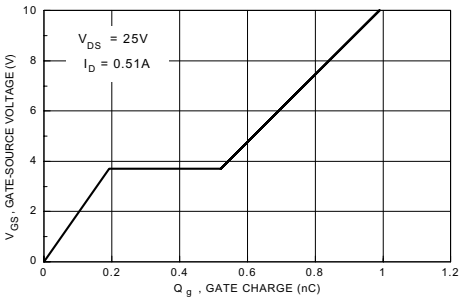


Figure 10. Gate Charge Characteristics.

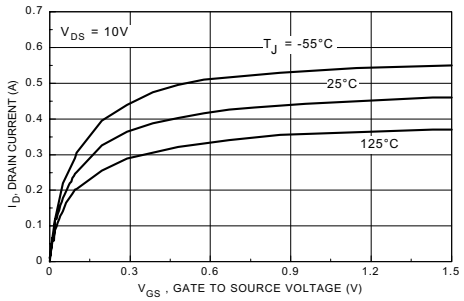


Figure 11. Transconductance Variation with Drain Current and Temperature.

RATING CHARACTERISTIC CURVES (2N7002DSPT)

Typical Thermal Characteristics

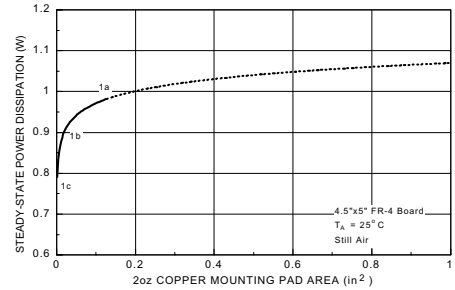


Figure 12. SOT-6 Dual Package Maximum Steady-State Power Dissipation versus Copper Mounting Pad Area.

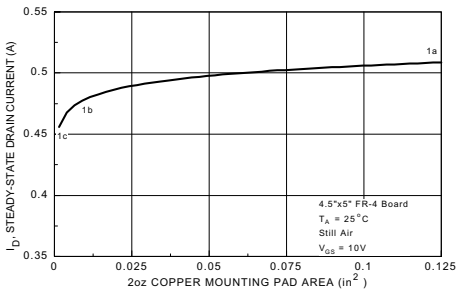


Figure 13. Maximum Steady-State Drain Current versus Copper Mounting Pad Area.

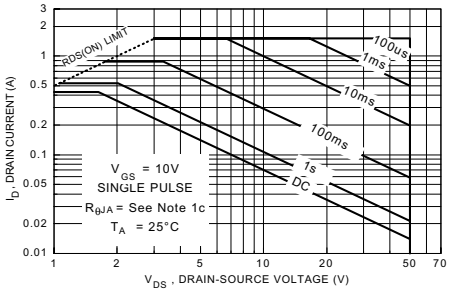


Figure 14. Maximum Safe Operating Area.

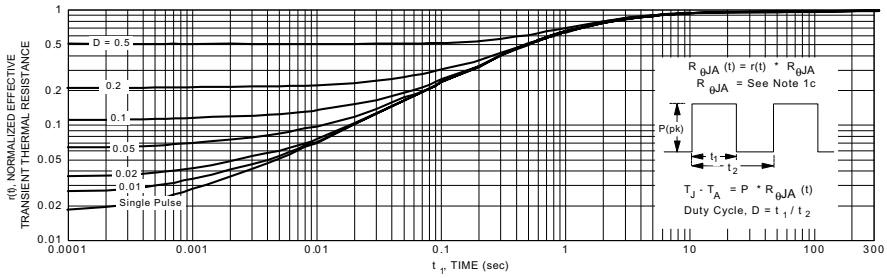


Figure 15. Transient Thermal Response Curve.

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