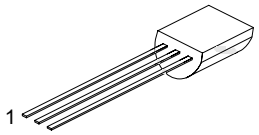
2N7000

Power MOSFET

N-CHANNEL ENHANCEMENT MODE



TO-92

*Pb-free plating product number:2N7000L

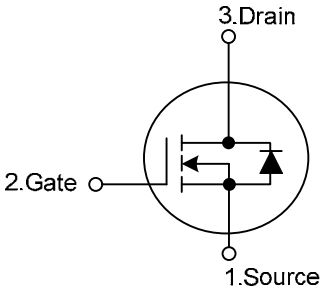
■ DESCRIPTION

The UTC **2N7000** has been designed to minimize on-state resistance while provide rugged, reliable, and fast switching performance. It can be used in most applications requiring up to 400mA DC and can deliver pulsed currents up to 2A. The product is particularly suited for low voltage, low current applications such as small servo motor control, power MOSFET gate drivers, and other switching applications

■ FEATURES

*High density cell design for low $R_{DS(ON)}$
*Voltage controlled small signal switch
*Rugged and reliable
*High saturation current capability

■ SYMBOL



■ ORDERING INFORMATION

Order Number		Package	Pin Assignment			Packing
Normal	Lead Free Plating		1	2	3	
2N7000-T92-B	2N7000L-T92-B	TO-92	S	G	D	Tape Box
2N7000-T92-K	2N7000L-T92-K	TO-92	S	G	D	Bulk
2N7000-T92-R	2N7000L-T92-R	TO-92	S	G	D	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

2N7000L-T92-B (1)Packing Type (2)Package Type (3)Lead Plating	(1) B: Tape Box, K: Bulk, R: Tape Reel (2) T92: TO-92 (3) L: Lead Free Plating, Blank: Pb/Sn

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	60	V
Drain-Gate Voltage (R_{GS}≤1MΩ)			V_{DGR}	60	V
Gate -Source Voltage	Continuous		V_{GS}	±20	V
	Non Repetitive (tp<50μs)			±40	V
Maximum Drain Current		Continuous	I_D	115	mA
		Pulsed		800	mA
Maximum Power Dissipation Derated above 25°C			P_D	400 3.2	mW mW/°C
Operating and Storage Temperature			T_J,T_{STG}	-55 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction-to-Ambient	θ_{JA}	312.5	°C/W

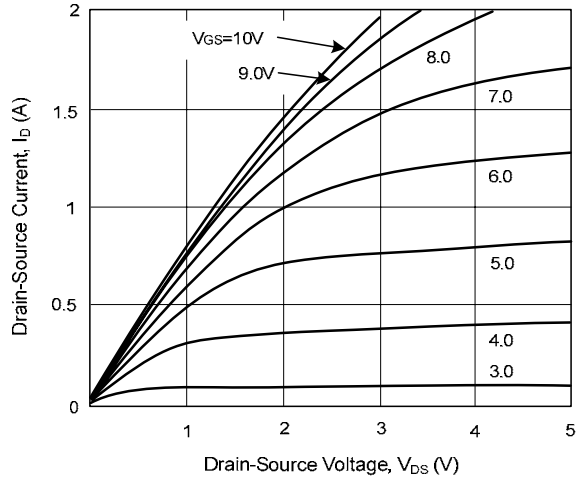
■ ELECTRICAL CHARACTERISTICS (Ta =25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=10 μA	60			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=60V, V_{GS} =0V			1	μA
		T_J=125°C			0.5	mA
Gate-Body leakage, Forward	I_{GSSF}	V_{GS} =20V, V_{DS}=0V			100	nA
Gate-Body leakage Reverse	I_{GSSR}	V_{GS} =-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS (Note)						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS} =V_{GS}, I_D=250μA	1	2.1	2.5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS} =10V, I_D=500mA		1.2	7.5	Ω
		T_J=100°C		1.7	13.5	
		V_{GS} =5.0V, I_D=50mA		1.7	7.5	
		T_J=100°C		2.4	13.5	
Drain-Source On-Voltage	$V_{DS(ON)}$	V_{GS} = 10V, I_D=500mA		0.6	3.75	V
		V_{GS} = 5.0V, I_D=50mA		0.09	1.5	
On-State Drain Current	$I_{D(ON)}$	V_{GS}=10V, V_{DS}≧2$V_{DS(ON)}$	500	2700		mA
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	V_{DS}=25V,V_{GS}=0V, f=1.0MHz		20	50	pF
Output Capacitance	C_{OSS}			11	25	pF
Reverse Transfer Capacitance	C_{RSS}			4	5	pF
Turn-On Time	t_{ON}	V_{DD}=30V, R_L=150Ω, I_D=200mA, V_{GS}=10V, R_{GEN}=25Ω			20	ns
Turn-Off Time	t_{OFF}	V_{DD}=30V, R_L=150Ω, I_D=200mA, V_{GS}=10V, R_{GEN}=25Ω			20	ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, Is=115mA(Note)		0.88	1.5	V
Maximum Continuous Drain-Source Diode Forward Current	Is				115	mA
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				0.8	A

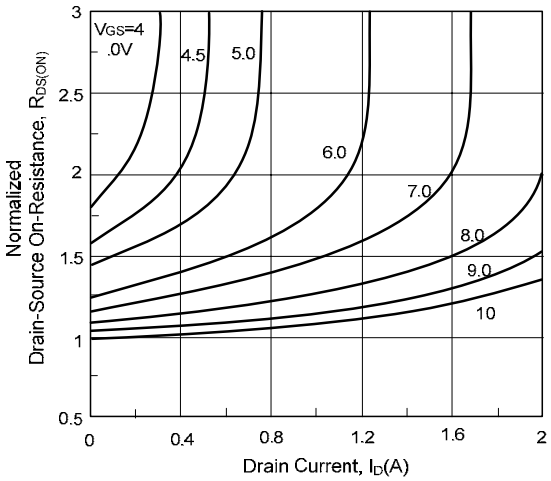
Note: Pulse Test: Pulse Width≤300μs, Duty Cycle≤2.0%

■ TYPICAL CHARACTERISTICS

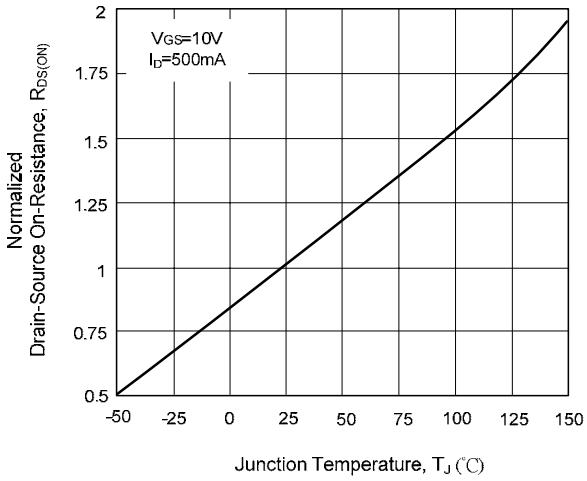
On-Region Characteristics



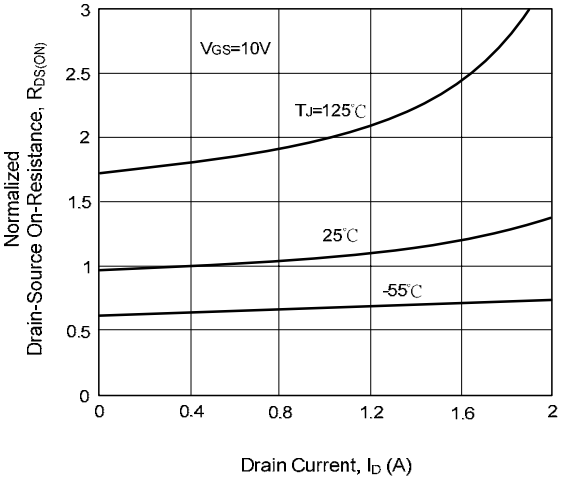
On-Resistance vs. Gate Voltage and Drain Current



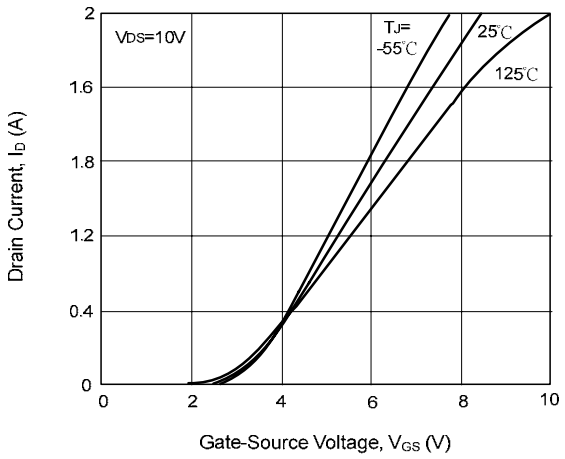
On-Resistance vs. JunctionTemperature



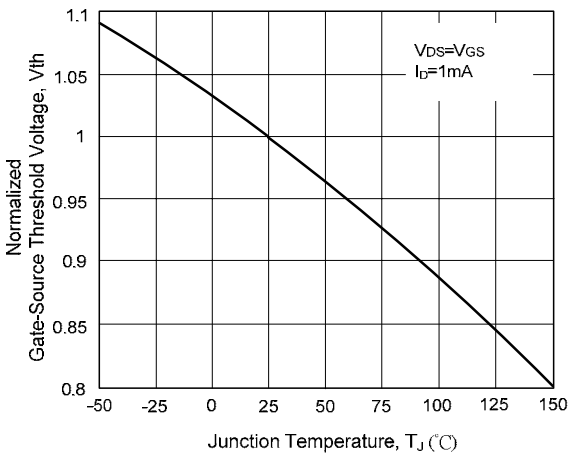
On-Resistance vs. Drain Current



Transfer Characteristics

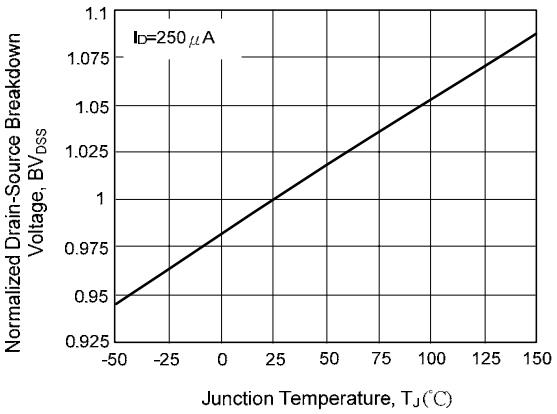


Gate Threshold vs. Junction Temperature

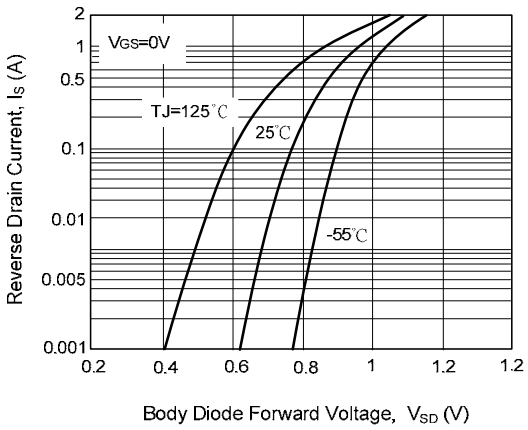


■ TYPICAL CHARACTERISTICS(Cont.)

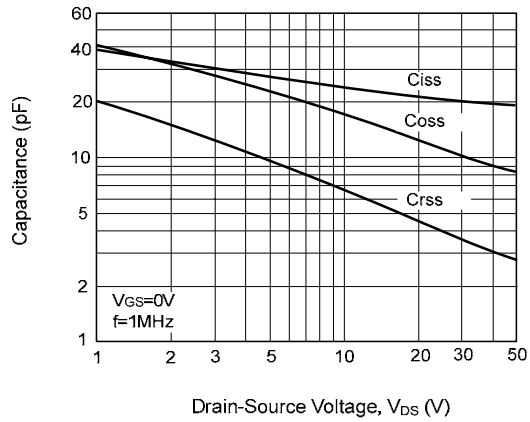
Breakdown Voltage vs. Junction Temperature



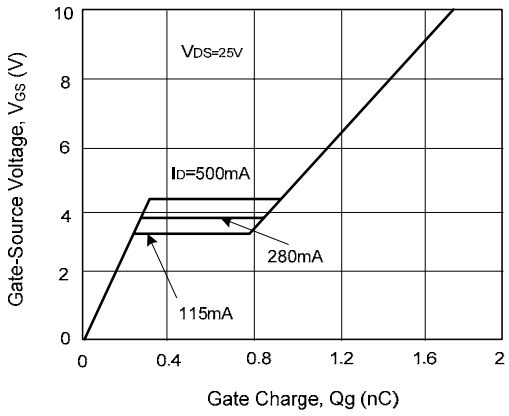
Reverse Drain Current vs. Body Diode Forward Voltage



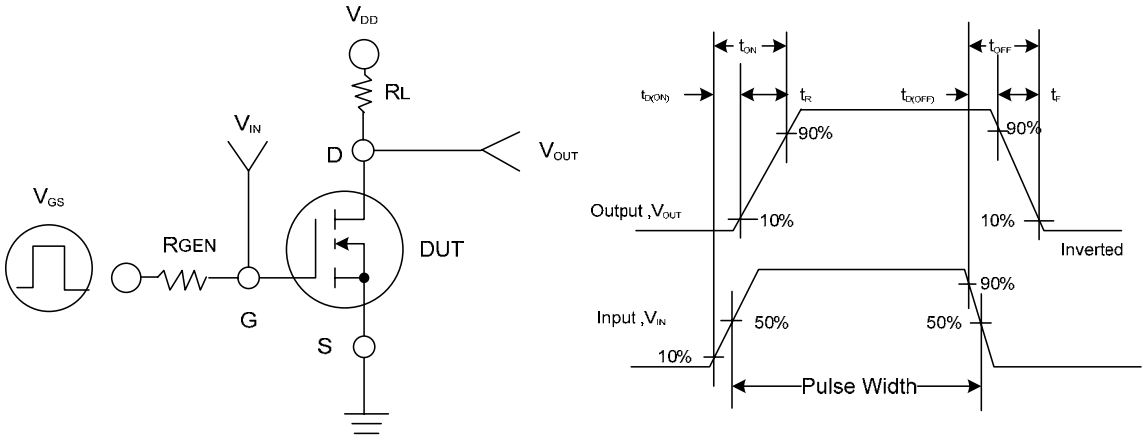
Capacitance Characteristics



Gate Charge Characteristics

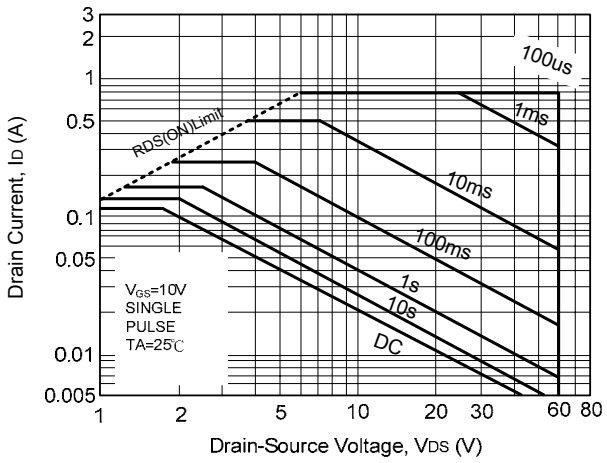


Switching Waveforms



■ TYPICAL CHARACTERISTICS(Cont.)

Maximum Safe Operating Area



Transient Thermal Response Curve