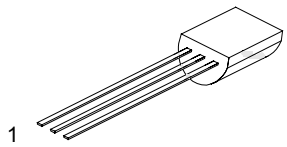
N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR



TO-92

1: SOURCE 2: GATE 3: DRAIN

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

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_{GSS}	±20	V
-Non Repetitive (tp<50μs)		±40	
Maximum Drain Current-Continuous	I_D	115	mA
-Pulsed		800	
Maximum Power Dissipation	P_D	400	mW
Derated above 25°C		3.2	mW/°C
Operating and Storage Temperature Range	T_J,T_{STG}	-55 to +150	°C
Maximum Lead Temperature for Soldering Purposes, 1/16" from Case for 10 Seconds	T_L	300	°C

THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	312.5	°C/W

ELECTRICAL CHARACTERISTICS (T a =25°C, unless otherwise noted)

PARAMETER	SYMBOL	CONDITIONS.	MIN	TYP	MAX	UNITS
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=10 μA	60			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V, V_{GS} =0V			1	μ A
		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=250 μ A	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}≧2V_{DS}(on)	500	2700		mA
Forward Transconductance	g_{FS}	V_{DS}≧2V_{DS}(on), I_D=200mA	80	320		mS
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V,		20	50	pF
Output Capacitance	C_{oss}	f=1.0MHz		11	25	pF
Reverse Transfer Capacitance	C_{rss}			4	5	pF
Turn-On Time	t_{on}	V_{DD}=30V, R_L=150 Ω , I_D=200mA, V_{GS}=10V, R_{GEN}=25 Ω			20	ns
Turn-Off Time	t_{off}	V_{DD}=30V, R_L=150 Ω , I_D=200mA, V_{GS}=10V, R_{GEN}=25 Ω			20	ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Maximum Continuous Drain-Source Diode Forward Current	Is				115	mA
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				0.8	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, Is=115mA(Note)		0.88	1.5	V

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

Figure 1. On-Region Characteristics

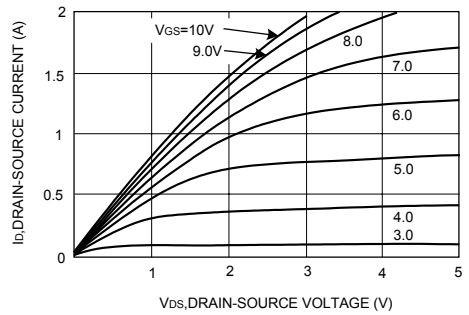


Figure 2. On-Resistance Varisation with Gate Voltage and Drain Current

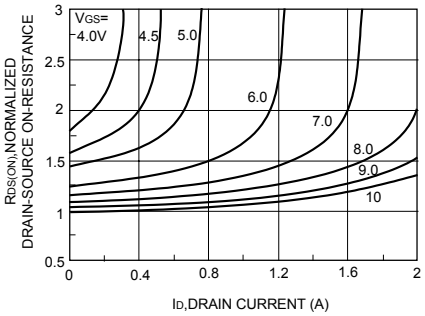


Figure 3. On-Resistance Varisation with Temperature

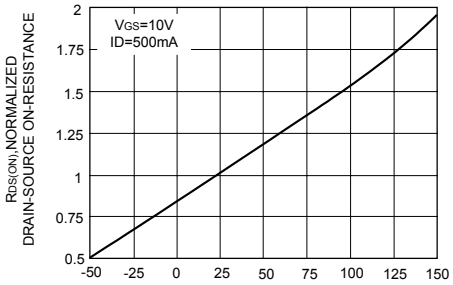


Figure 4. On-Resistance Varisation with Drain Current and Temperature

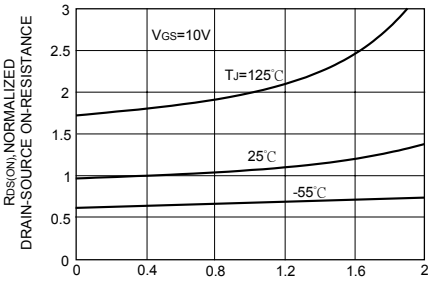


Figure 5.Transfer Characteristics

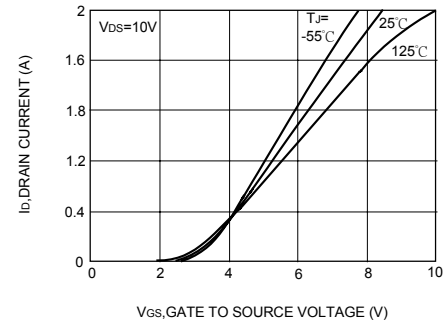


Figure 6. Gate Threshold Varisation with Temperature

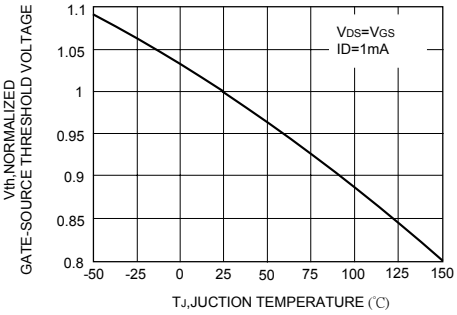


Figure7. Breakdown Voltage Varisation with Temperature

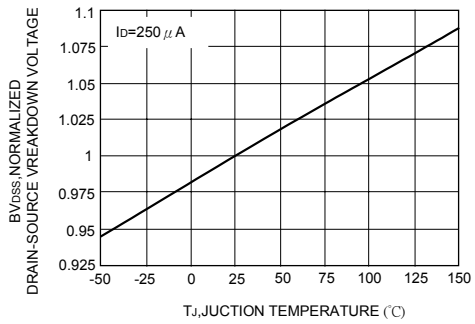


Figure 8. Body Diode Forward Voltage Varisation with Temperature

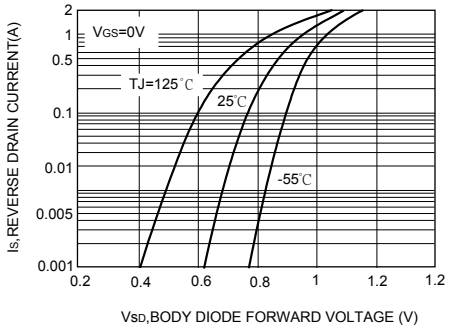


Figure9.Capacitance Characteristics

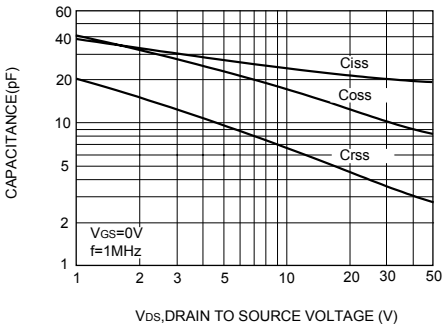


Figure10. Gate Charge Characteristics

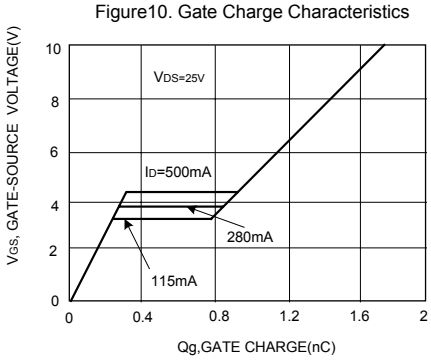


Figure11

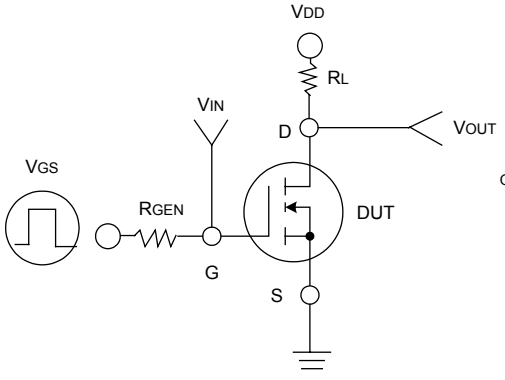


Figure12. Switching Waveforms

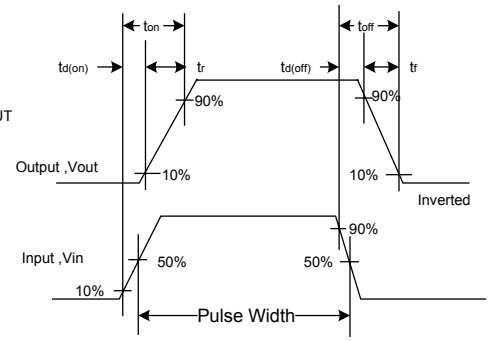


Figure 13. Maximum Safe Operating Area

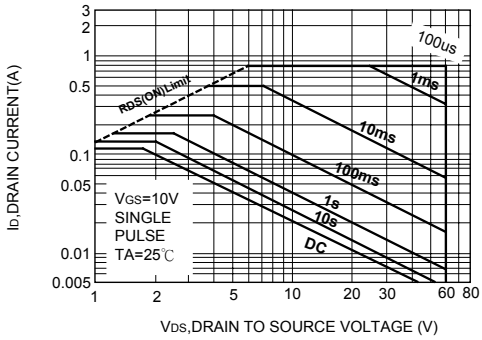


Figure 14. Transient Thermal Response Curve