

UNISONIC TECHNOLOGIES CO., LTD

2N7000

Power MOSFET

N-CHANNEL ENHANCEMENT MODE

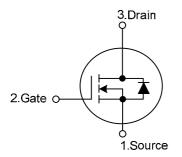
DESCRIPTION

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

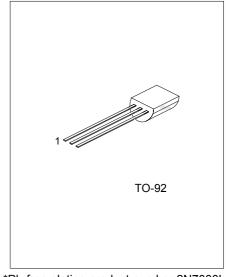


ORDERING INFORMATION

Order	Order Number		Pin Assignment			Docking	
Normal	Lead Free Plating	Package	1	2	3	Packing	
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
l			



*Pb-free plating product number:2N7000L

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

		- /		
PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DSS}	60	V
Drain-Gate Voltage (R _{GS} ≤1№	/Ω)	V _{DGR}	60	V
Cata Cauraa Valtaga	Continuous	V	±20	V
Gate -Source Voltage	Non Repetitive (tp<50µs)	V _{GS}	±40	V
Maximum Drain Current	Continuous	nuous 115		mA
	Pulsed	ID ID	800	mA
Maximum Power Dissipatior	1	PD	400	mW
Derated above 25°C	ed above 25°C		3.2	mW/°C
Operating and Storage Tem	perature	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)

ERISTIC	S (Ta =25°C, unless otherwise spece	cified)				
SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
•	·		•			
BV _{DSS}	V _{GS} =0V,I _D =10 μA	60			V	
	V _{DS} =60V, V _{GS} =0V			1	μA	
IDSS	TJ=125°C			0.5	mA	
I _{GSSF}	V _{GS} =20V, V _{DS} =0V			100	nA	
I _{GSSR}	V _{GS} =-20V, V _{DS} =0V			-100	nA	
•	·		•			
V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250µA	1	2.1	2.5	V	
	V _{GS} =10V, I _D =500mA		1.2	7.5		
R _{DS(ON)}	T _J =100°C		1.7	13.5	Ω	
	V _{GS} =5.0V, I _D =50mA		1.7	7.5		
	T _J =100°C		2.4	13.5		
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	1	
I _{D(ON)}	V _{GS} =10V, V _{DS} 2V _{DS(ON)}	500	2700		mA	
•	·		•			
CISS			20	50	pF	
Coss	V _{DS} =25V,V _{GS} =0V, f=1.0MHz		11	25	pF	
C _{RSS}			4	5	pF	
t _{on}	$V_{DD}=30V, R_{L}=150\Omega,$			20	ns	
t _{OFF}	$V_{DD}=30V, R_{L}=150\Omega, I_{D}=200MA,$ $V_{GS}=10V, R_{GEN}=25\Omega$			20	ns	
ERISTICS	AND MAXIMUM RATINGS		•			
V	(-0)(10-115mA(Noto))		0.88	1.5	V	
VSD	$v_{GS} - v_v$, $IS = I I DIIIA(INOLE)$					
ls				115	mA	
I _{SM}				0.8	А	
	SYMBOL BVDSS IDSS IGSSF IGSSF IGSSF IGSSF VGS(TH) RDS(ON) ID(ON)	$\begin{tabular}{ c c c c c } \hline $ SYMBOL & $ TEST CONDITIONS \\ \hline $ BV_{DSS} & V_{GS} = 0V, I_D = 10 \ \mu A \\ $ V_{DS} = 60V, V_{GS} = 0V \\ $ T_J = 125^{\circ}C $ \\ \hline $ I_{GSSF} & V_{GS} = 20V, V_{DS} = 0V \\ \hline $ I_{GSSR} & V_{GS} = -20V, V_{DS} = 0V \\ \hline $ I_{GSSR} & V_{GS} = -20V, V_{DS} = 0V \\ \hline $ V_{GS} = 10V, I_D = 500 \mbox{mA} \\ $ T_J = 100^{\circ}C $ \\ \hline $ V_{DS} = 5.0V, I_D = 50 \mbox{mA} \\ $ T_J = 100^{\circ}C $ \\ \hline $ V_{DS} = 10V, I_D = 500 \mbox{mA} \\ \hline $ T_J = 100^{\circ}C $ \\ \hline $ V_{DS} = 10V, I_D = 500 \mbox{mA} \\ \hline $ T_J = 100^{\circ}C $ \\ \hline $ V_{DS} = 5.0V, I_D = 500 \mbox{mA} \\ \hline $ T_J = 100^{\circ}C $ \\ \hline $ V_{DS} = 5.0V, I_D = 500 \mbox{mA} \\ \hline $ T_J = 100^{\circ}C $ \\ \hline $ V_{DS} = 10V, V_{DS} = 2V_{DS}(0N) $ \\ \hline $ V_{GS} = 10V, V_{DS} = 2V_{DS}(0N) $ \\ \hline $ T_{GRS} $ \\ \hline $ V_{DS} = 25V, V_{GS} = 0V, f = 1.0 \mbox{MHz} $ \\ \hline $ T_{CRSS} $ \\ \hline $ V_{DD} = 30V, R_L = 150\Omega, $ I_D = 200 \mbox{mA}, $ V_{GS} = 10V, R_{GEN} = 25\Omega $ \\ \hline $ t_{OFF} $ $ V_{DD} = 30V, R_L = 150\Omega, $ I_D = 200 \mbox{mA}, $ V_{GS} = 10V, R_{GEN} = 25\Omega $ \\ \hline $ ERISTICS $ AND $ MAXIMUM $ RATINGS $ \\ \hline $ V_{SD} $ $ V_{GS} = 0V, I_S = 115 \mbox{mA}(Note $) $ \\ \hline $ IS $ $	$ \begin{array}{ c c c c c c } BV_{DSS} & V_{GS} = 0V, I_D = 10 \ \mu A & 60 \\ \hline & V_{DS} = 60V, V_{GS} = 0V & \\ \hline & T_J = 125^\circ C & \\ \hline & I_{GSSF} & V_{GS} = 20V, V_{DS} = 0V & \\ \hline & I_{GSSR} & V_{GS} = -20V, V_{DS} = 0V & \\ \hline & V_{GS(TH)} & V_{DS} = V_{GS}, I_D = 250 \ \mu A & 1 & \\ \hline & V_{GS} = 10V, I_D = 500 \ m A & \\ \hline & T_J = 100^\circ C & \\ \hline & V_{DS(ON)} & \hline & V_{GS} = 10V, I_D = 500 \ m A & \\ \hline & V_{GS} = 5.0V, I_D = 500 \ m A & \\ \hline & V_{GS} = 5.0V, I_D = 500 \ m A & \\ \hline & V_{DS(ON)} & \hline & V_{GS} = 10V, V_{DS} & 2V_{DS(ON)} & 500 \\ \hline & C_{ISS} & \\ \hline & C_{OSS} & V_{DS} = 25V, V_{GS} = 0V, f = 1.0 \ \text{MHz} & \\ \hline & C_{RSS} & \\ \hline & t_{ON} & V_{DD} = 30V, \ R_L = 150\Omega, \ I_D = 200 \ m A, \ V_{GS} = 10V, \ R_{GEN} = 25\Omega & \\ \hline & t_{OFF} & V_{DD} = 30V, \ R_L = 150\Omega, \ I_D = 200 \ m A, \ V_{GS} = 10V, \ R_{GEN} = 25\Omega & \\ \hline & ERISTICS \ AND \ MAXIMUM \ RATINGS & \\ \hline & V_{SD} & V_{GS} = 0V, \ I_S = 115 \ m A(\ Note \) & \\ \hline & I_S & \\ \hline & I_S & \\ \hline \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{ c c c c c c } \hline \mbox{YMBOL} & \mbox{TEST CONDITIONS} & \mbox{MIN} & \mbox{TYP} & \mbox{MAX} \\ \hline \mbox{BV}_{DSS} & \mbox{V}_{GS}=0V, \mbox{I}_{D}=10\ \mu A & 60 & & & & & & & & & & & & & & & & & $	

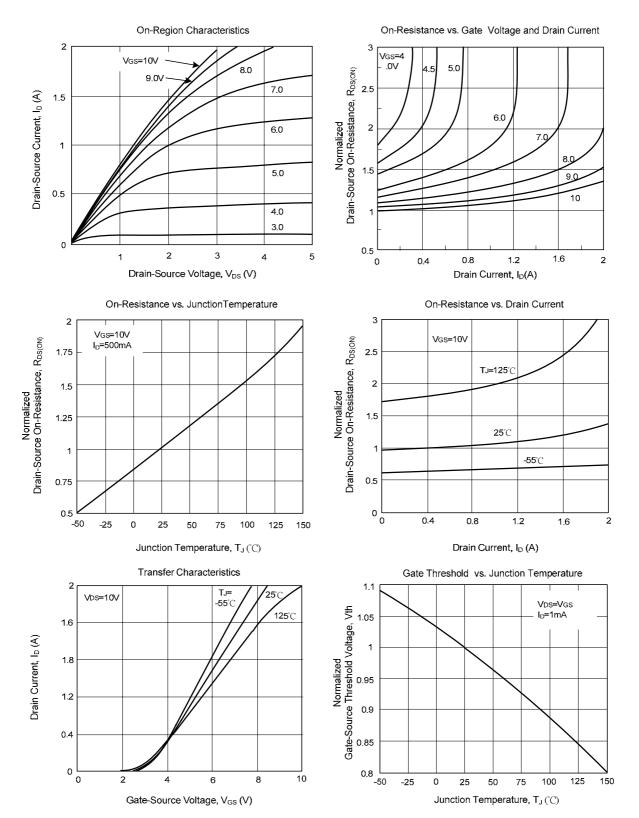
Note: Pulse Test: Pulse Width≤300µs, Duty Cycle≤2.0%



2N7000

Power MOSFET

TYPICAL CHARACTERISTICS





60

40

20

10

5

2

1

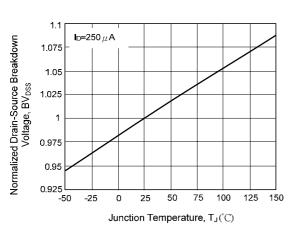
1

VGS=0V f=1MHz

2 3

Capacitance (pF)

■ TYPICAL CHARACTERISTICS(Cont.)



Capacitance Characteristics

5

10

Drain-Source Voltage, VDS (V)

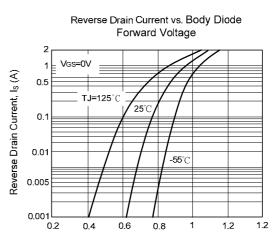
Ciss

Coss

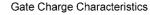
Crss

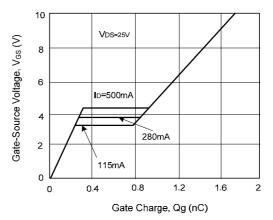
20 30 50

Breakdown Voltage vs. Junction Temperature

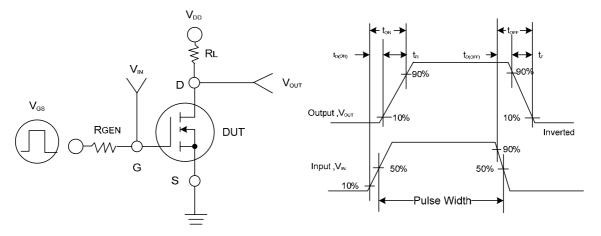


Body Diode Forward Voltage, V_{SD} (V)



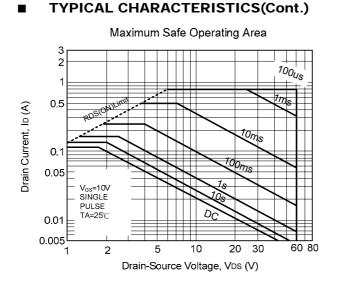


Switching Waveforms

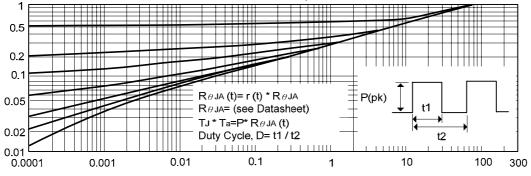




2N7000



Transient Thermal Response Curve



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