



## UP2003

Power MOSFET

### P-CHANNEL LOGIC LEVEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

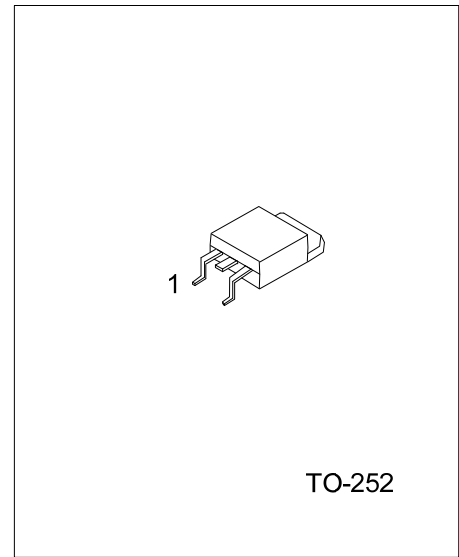
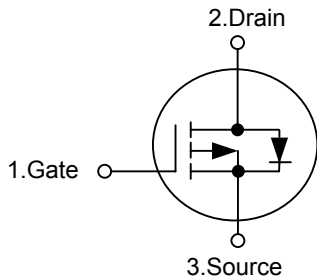
#### DESCRIPTION

The **UP2003** uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

#### FEATURES

- \*  $V_{DS}(V)=-25V$
- \*  $I_D=-9 A$
- \*  $R_{DS(ON)}<35 m\Omega @ V_{GS}=-4.5 V, I_D=-7 A$
- \*  $R_{DS(ON)}<20 m\Omega @ V_{GS}=-10 V, I_D=-9 A$

#### SYMBOL



\*Pb-free plating product number: UP2003L

#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Normal	Lead Free Plating		1	2	3	
UP2003-TN3-R	UP2003L-TN3-R	TO-252	G	D	S	Tape Reel
UP2003-TN3-T	UP2003L-TN3-T	TO-252	G	D	S	Tube

<p>UP2003L-TN3-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Plating</p>	<p>(1) R: Tape Reel, T: Tube</p> <p>(2) TN3:TO-252</p> <p>(3) L: Lead Free Plating, Blank: Pb/Sn</p>
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■ ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Gate Source voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	-9	A
Pulsed Drain Current (Note 1)	$I_{DM}$	-50	
Power Dissipation	$P_D$	2.5	W
Junction Temperature	$T_J$	+150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 ~ +150	

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

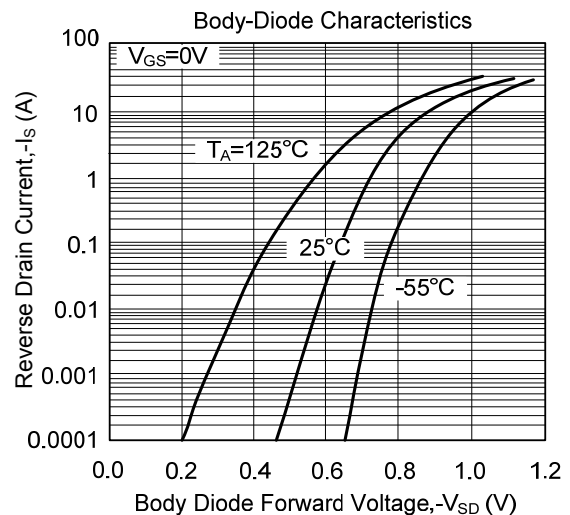
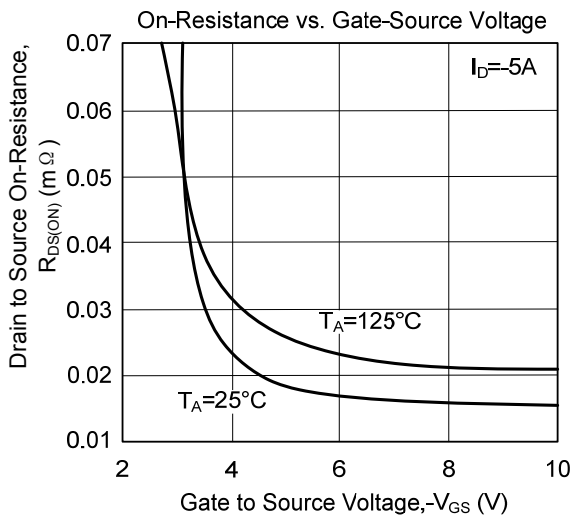
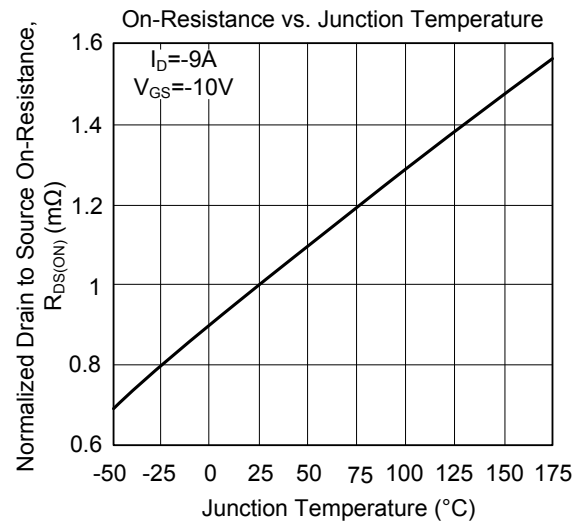
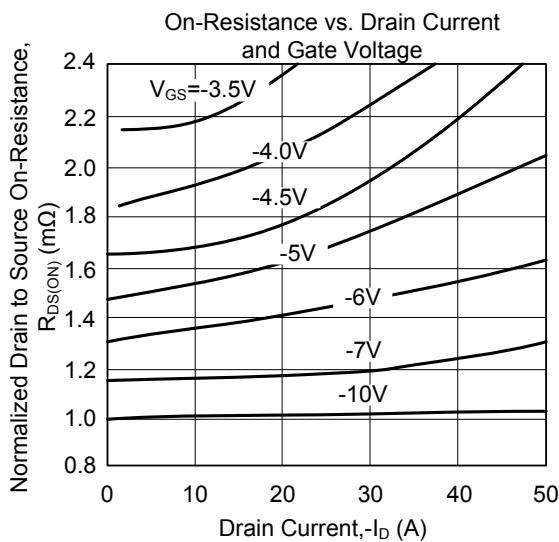
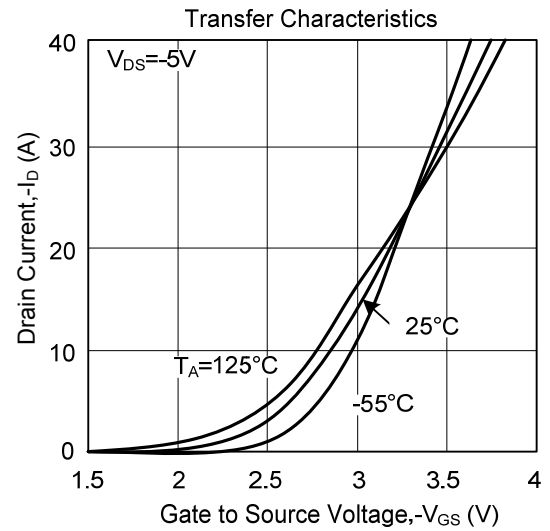
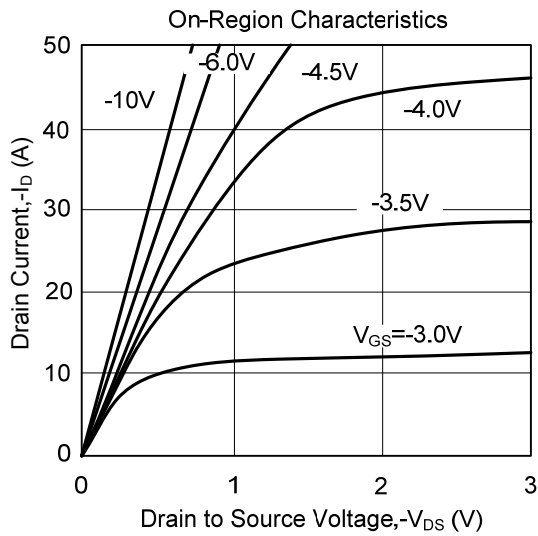
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Junction-to-Ambient	$\theta_{JA}$			50	$^\circ\text{C/W}$
Junction-to-Case	$\theta_{JC}$			25	$^\circ\text{C/W}$

■ ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

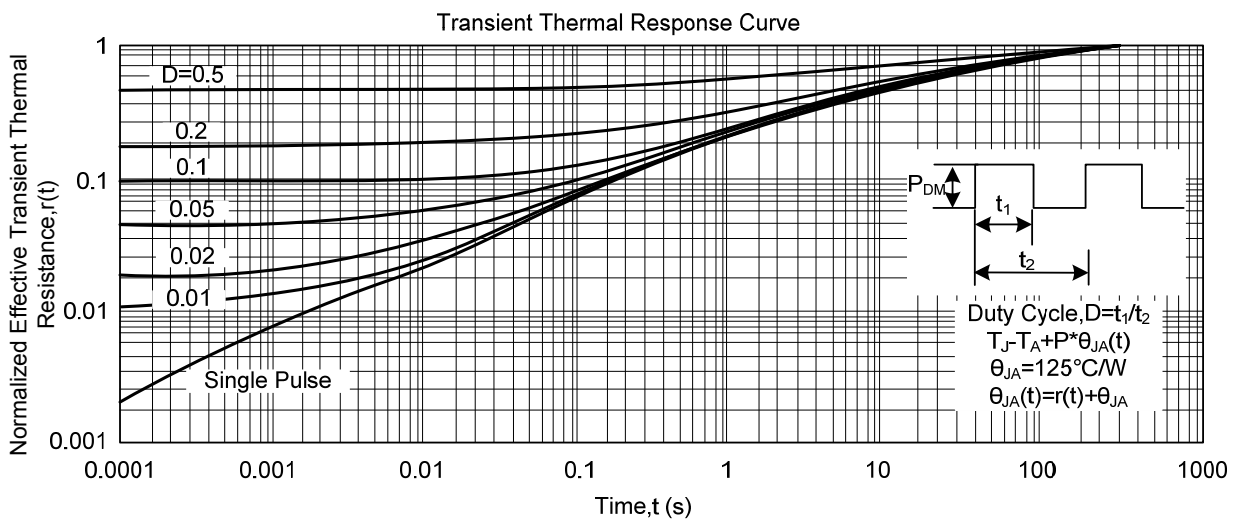
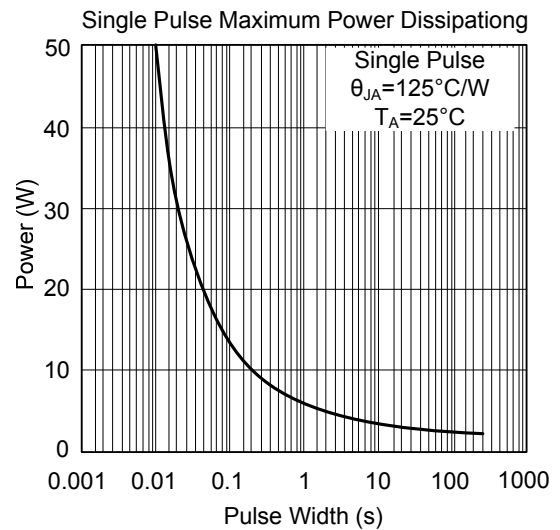
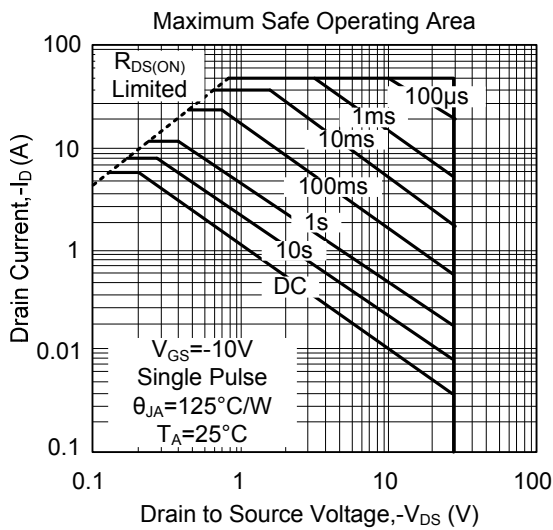
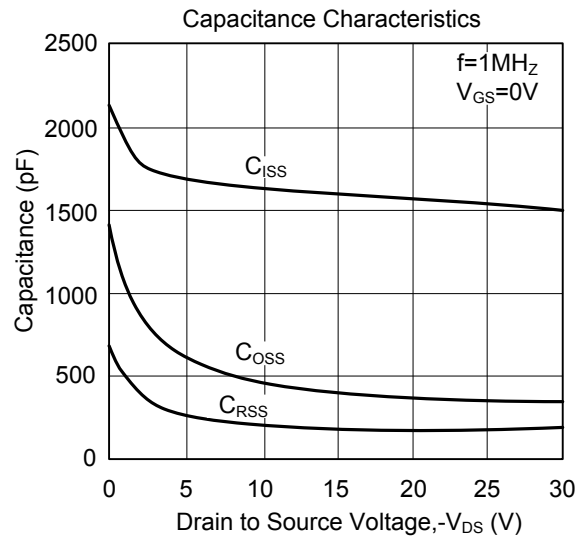
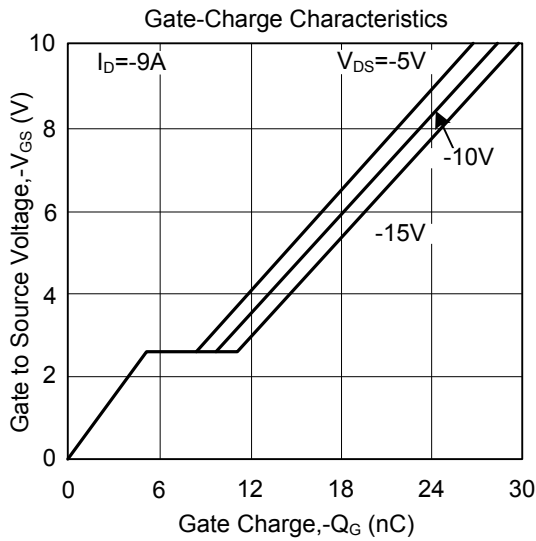
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\mu\text{A}$	-25			V
Drain Source Leakage Current	$I_{DSS}$	$V_{DS} = -24\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$			-10	
Gate-Body Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
<b>ON CHARACTERISTICS</b>						
Gate-Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	-1.0	-1.5	-3.0	V
On-State Drain Current (Note 2)	$I_{D(ON)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	-50			A
Drain-Source On-Resistance (Note 2)	$R_{DS(ON)}$	$V_{GS} = -4.5\text{ V}, I_D = -7\text{ A}$		25	35	m $\Omega$
		$V_{GS} = -10\text{ V}, I_D = -9\text{ A}$		15	20	
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS} = -15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		1610		pF
Output Capacitance	$C_{OSS}$			410		
Reverse Transfer Capacitance	$C_{RSS}$			200		
<b>SWITCHING PARAMETERS (Note 3)</b>						
Gate to Source Charge	$Q_G$	$V_{DS} = -0.5V_{(BR)DSS}, V_{GS} = -10\text{ V}, I_D = -9\text{ A}$		17	24	nC
Gate Charge at Threshold	$Q_{GS}$			5		
Gate to Drain Charge	$Q_{GD}$			6		
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DS} = -15\text{ V}, I_D \approx -1\text{ A}, V_{GS} = -10\text{ V}, R_{GS} = 6\Omega, R_L = 1\Omega$		6.2	9.3	ns
Turn-ON Rise Time	$t_R$			10		
Turn-OFF Delay Time	$t_{D(OFF)}$			18		
Turn-ON Delay Time	$t_{D(ON)}$			10		
Turn-OFF Fall-Time	$t_F$			5		
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Diode Continuous Forward Current	$I_S$				-2.1	A
Diode Pulse Current (Note 1)	$I_{SM}$				-4	
Forward Voltage (Note 2)	$V_{SD}$	$I_F = I_S, V_{GS} = 0\text{ V}$			-1.2	V

Note: 1. Pulse width limited by maximum junction temperature.  
2. Pulse test: Pulse Width  $\leq 300\mu\text{sec}$ , Duty Cycle  $\leq 2\%$   
3. Independent of operating temperature.

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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