



2N7002

Power MOSFET

0.3A, 60V N-CHANNEL POWER MOSFET

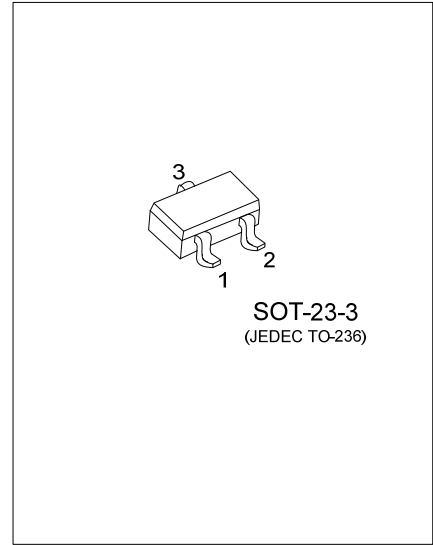
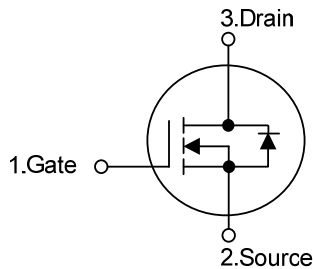
DESCRIPTION

The UTC **2N7002** uses advanced 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

- * High Density Cell Design for Low $R_{DS(ON)}$.
- * Voltage Controlled Small Signal Switch
- * Rugged and Reliable
- * High Saturation Current Capability

SYMBOL



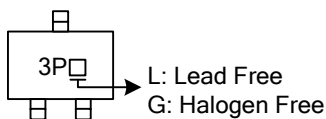
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
2N7002L-AE2-R	2N7002G-AE2-R	SOT-23-3	G	S	D	Tape Reel

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

2N7002G-AE2-R	(1)Packing Type	(1) R: Tape Reel
	(2)Package Type	(2) AE2: SOT-23-3
	(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

MARKING



■ ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ\text{C}$, unless otherwise specified.)

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V_{DSS}	60	V
Drain-Gate Voltage ($R_{GS} \leq 1\text{M}\Omega$)	V_{DGR}	60	V
Gate Source Voltage	V_{GSS}	Continuous	± 20
		Non Repetitive ($t_P < 50\mu\text{s}$)	± 40
Drain Current	I_D	Continuous	300
		Pulsed	800
Power Dissipation	P_D	200	mW
Derated Above 25°C		1.6	mW/ $^\circ\text{C}$
Junction Temperature	T_J	+ 150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 ~ +150	$^\circ\text{C}$

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}	625	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	215	$^\circ\text{C}/\text{W}$

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0\text{V}, I_D=10\mu\text{A}$	60			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=60\text{V}, V_{GS}=0\text{V}$			1	μA
Gate-Source Leakage Current	I_{GSSF}	$V_{GS}=20\text{V}, V_{DS}=0\text{V}$			100	nA
		$V_{GS}=-20\text{V}, V_{DS}=0\text{V}$			-100	nA
ON CHARACTERISTICS (Note)						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu\text{A}$	1.0	2.1	2.5	V
Drain-Source On-Voltage	$V_{DS(ON)}$	$V_{GS}=10\text{V}, I_D=300\text{mA}$		0.6	3.75	V
		$V_{GS}=5.0\text{V}, I_D=50\text{mA}$			0.375	
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}, I_D=300\text{mA}$			3.0	Ω
		$V_{GS}=4.5\text{V}, I_D=50\text{mA}$			4.0	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS}=25\text{V}, V_{GS}=0\text{V}, f=1.0\text{MHz}$			50	pF
Output Capacitance	C_{OSS}				25	pF
Reverse Transfer Capacitance	C_{RSS}				5	pF
Turn-On Time	t_{ON}	$V_{DD}=30\text{V}, R_L=150\Omega, I_D=200\text{mA},$			20	nS
Turn-Off Time	t_{OFF}	$V_{GS}=10\text{V}, R_G=25\Omega$			20	nS
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				300	mA
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				0.8	A
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0\text{V}, I_S=300\text{mA}$ (Note)		0.88	1.5	V

Note: Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$

■ TEST CIRCUIT AND WAVEFORM

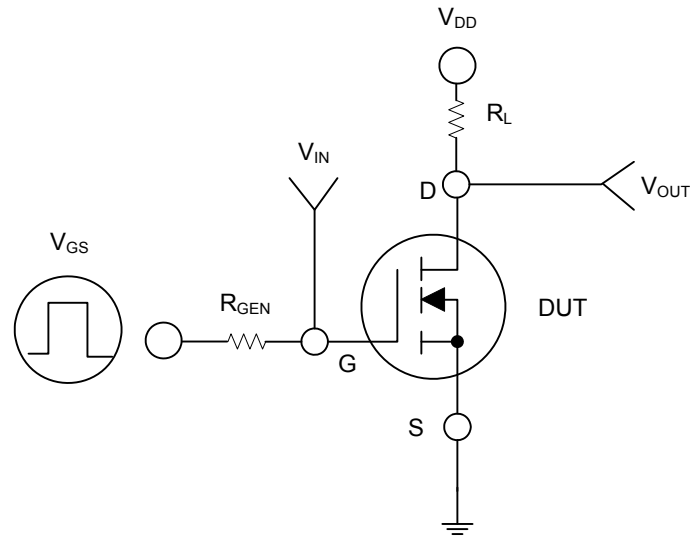


Fig. 1

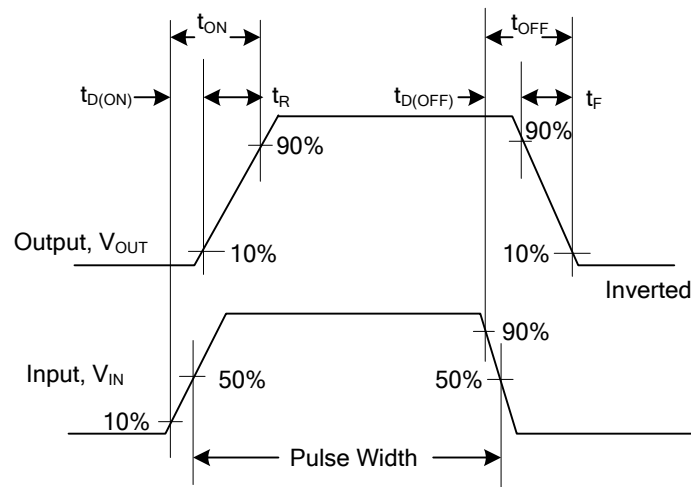
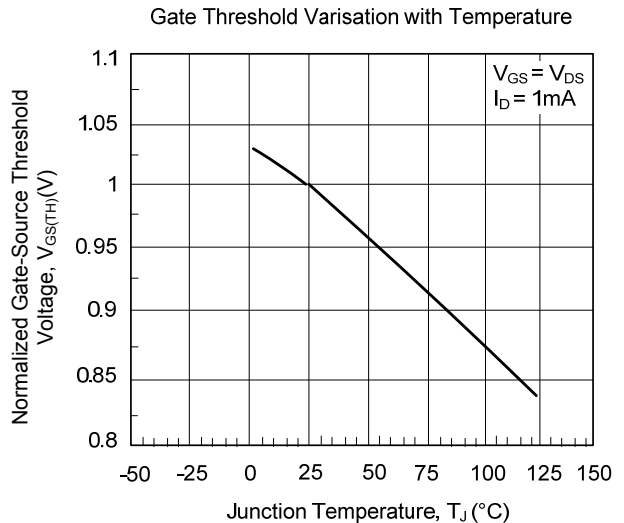
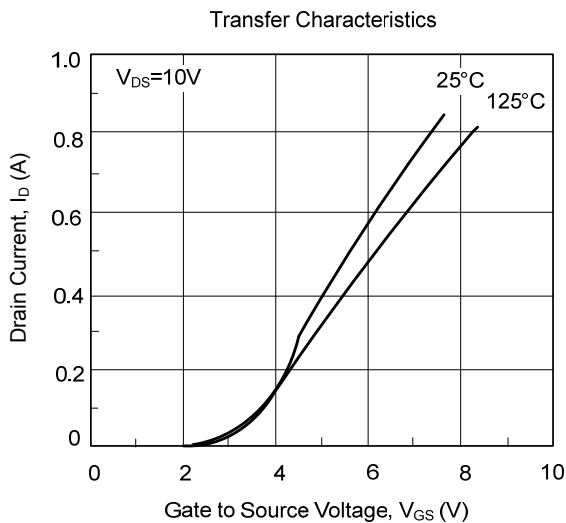
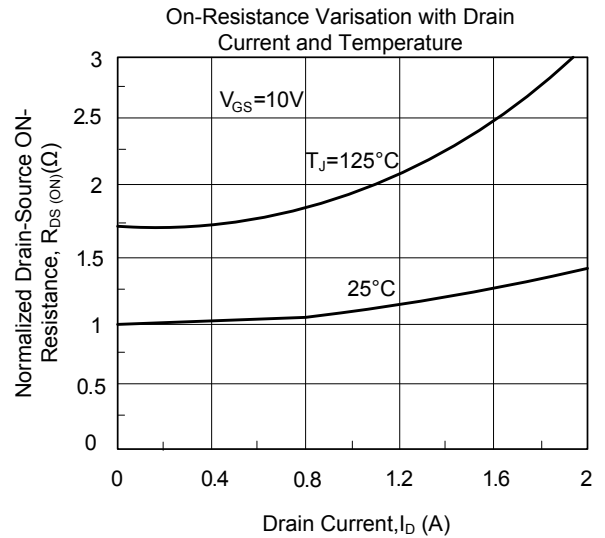
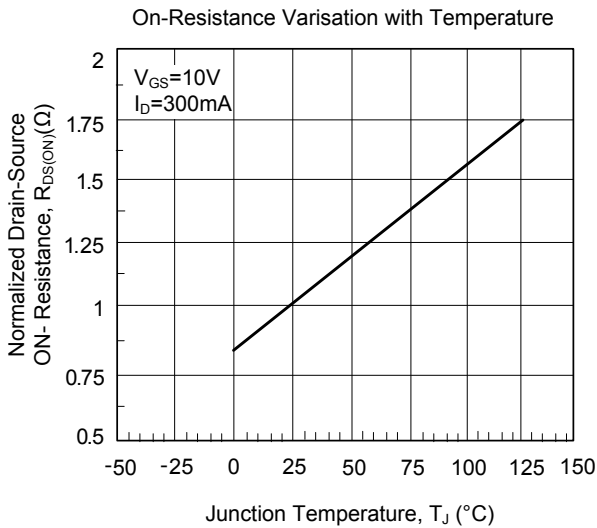
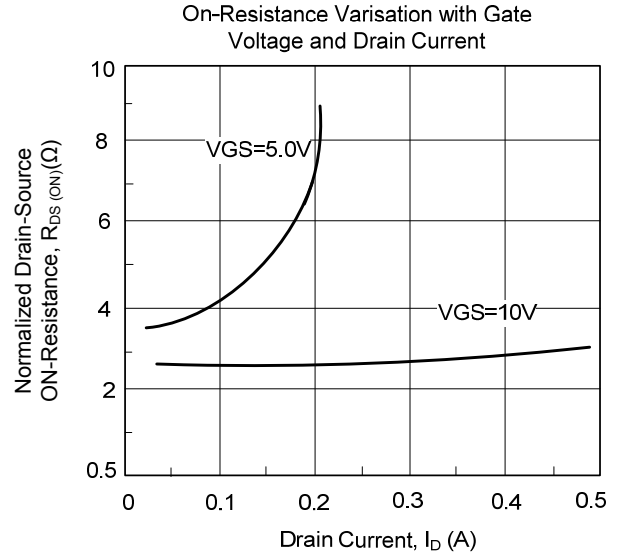
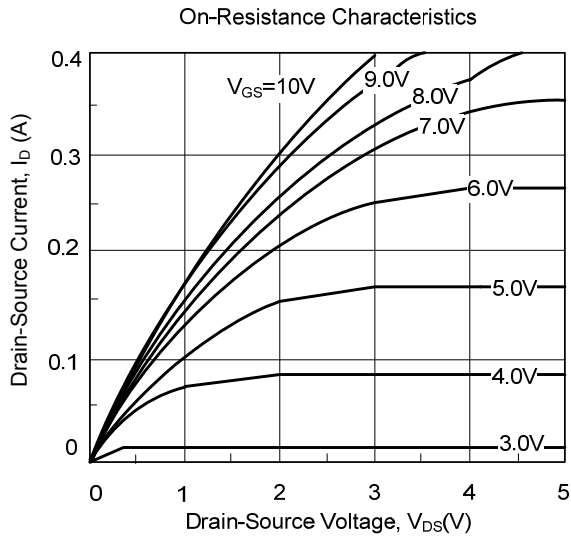


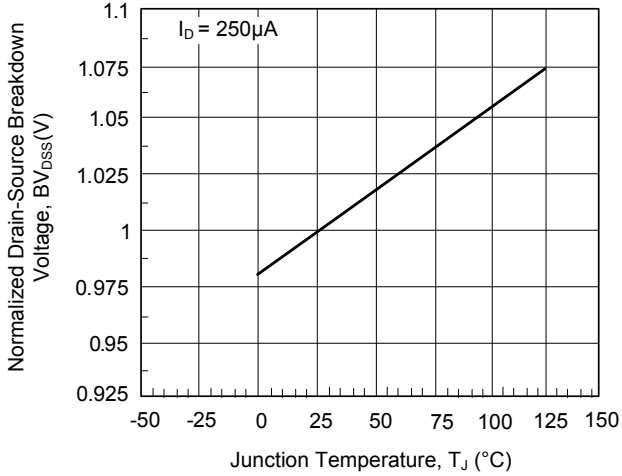
Fig. 2 Switching Waveforms

■ TYPICAL CHARACTERISTICS

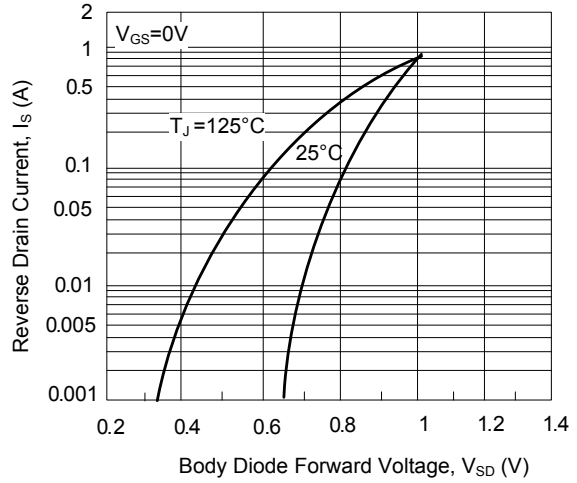


■ TYPICAL CHARACTERISTICS (Cont.)

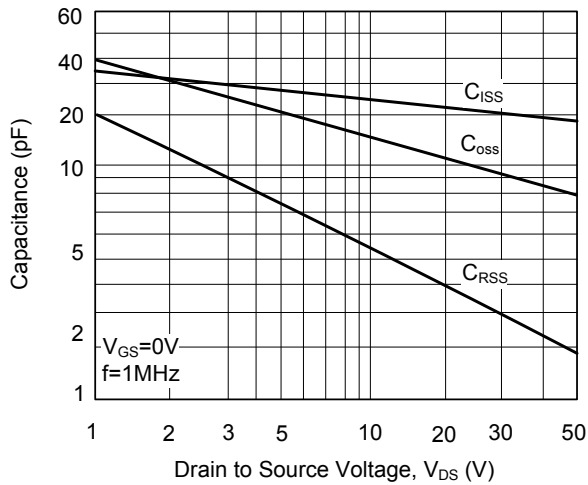
Breakdown Voltage Variation with Temperature



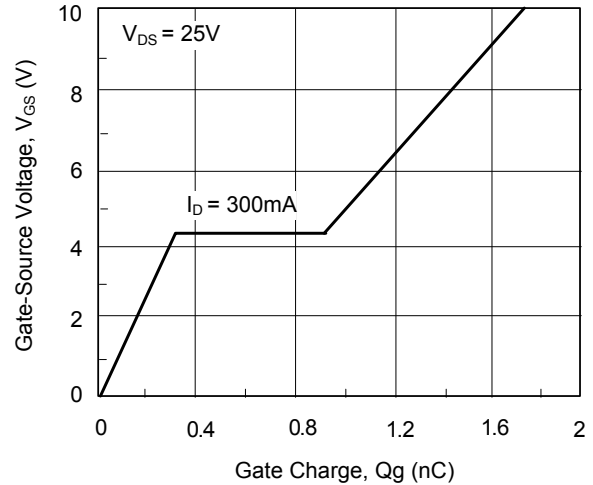
Body Diode Forward Voltage Variation with Temperature



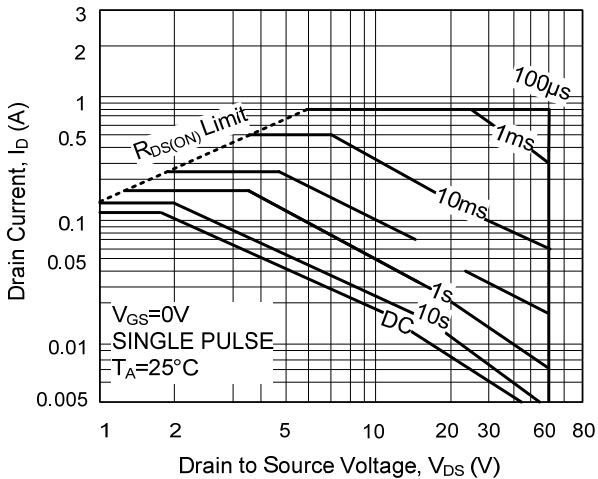
Capacitance Characteristics



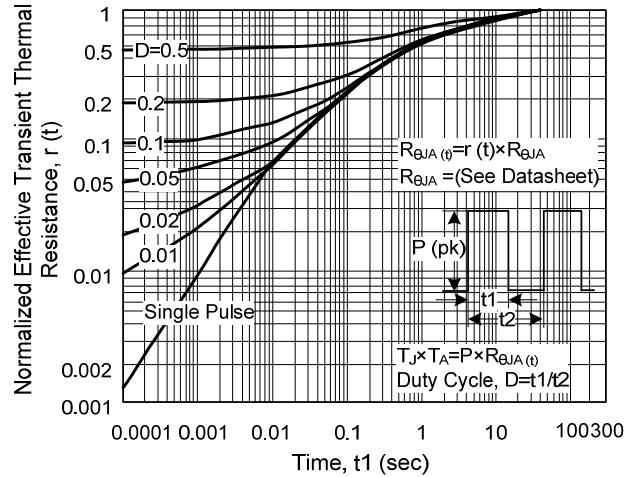
Gate Charge Characteristics



Maximum Safe Operating Area



Transient Thermal Response Curve



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