



2N7002

Power MOSFET

0.3A, 60V N-CHANNEL POWER MOSFET

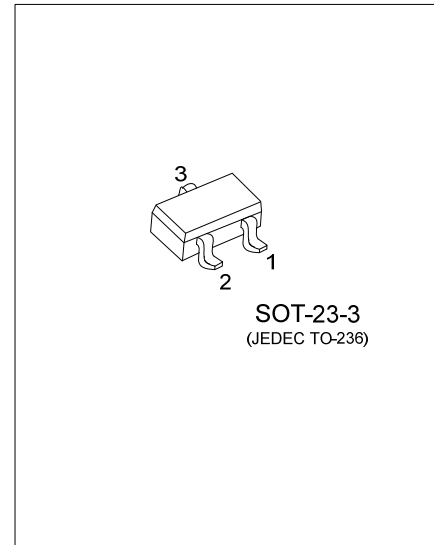
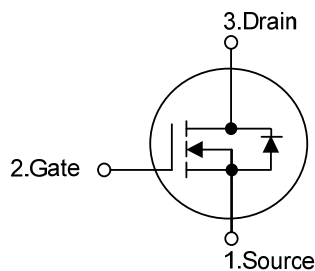
DESCRIPTION

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

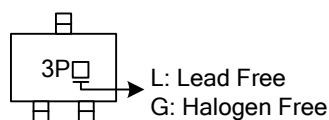


ORDERING INFORMATION

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

2N7002L-AE2-R		(1)Packing Type	(1) R: Tape Reel
		(2)Package Type	(2) AE2: SOT-23-3
		(3)Halogen Free	(3) L: Lead Free, G: Halogen Free

MARKING



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

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V_{DS}	60	V
Drain-Gate Voltage ($R_{GS} \leq 1\text{M}\Omega$)	V_{DGR}	60	V
Gate Source Voltage	V_{GSS}	± 20	V
		± 40	
Drain Current	I_D	300	mA
		800	
Power Dissipation	P_D	200	mW
Derated Above 25°C		1.6	$\text{mW}/^{\circ}\text{C}$
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} =0V, I _D =10μA	60			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V			1	μA
Gate-Source Leakage Current	I _{GSSF}	V _{GS} =20V, V _{DS} =0V			100	nA
	I _{GSSR}	V _{GS} =-20V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS (Note)						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D =250μA	1	2.1	2.5	V
Drain-Source On-Voltage	V _{DS (ON)}	V _{GS} = 10V, I _D =300mA		0.6	3.75	V
		V _{GS} = 5.0V, I _D =50mA			0.375	
Static Drain-Source On-Resistance	R _{DS (ON)}	V _{GS} =10V, I _D =300mA			7.5	Ω
		V _{GS} =5.0V, I _D =50mA			7.5	Ω
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 =25Ω, 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, I _S =300mA (Note)		0.88	1.5	V
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				0.8	A
Maximum Continuous Drain-Source Diode Forward Current	I _S				300	mA

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

■ TEST CIRCUIT AND WAVEFORM

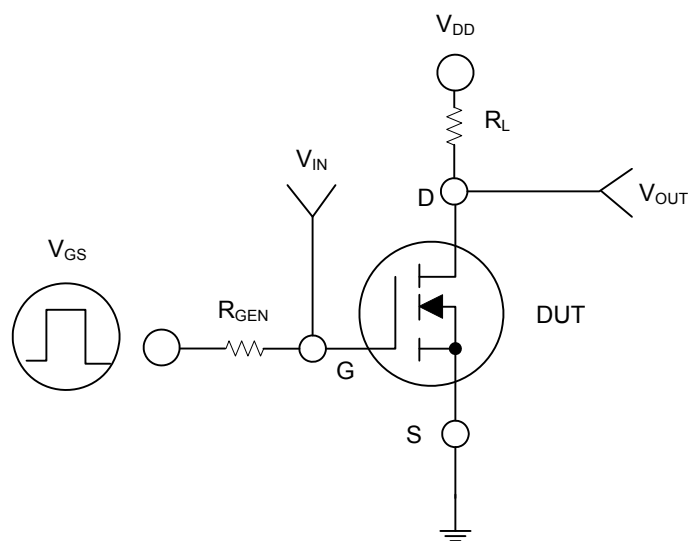


Fig. 1

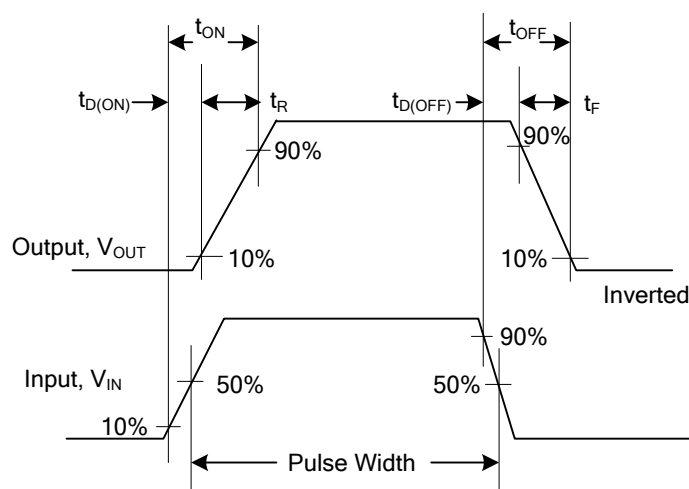
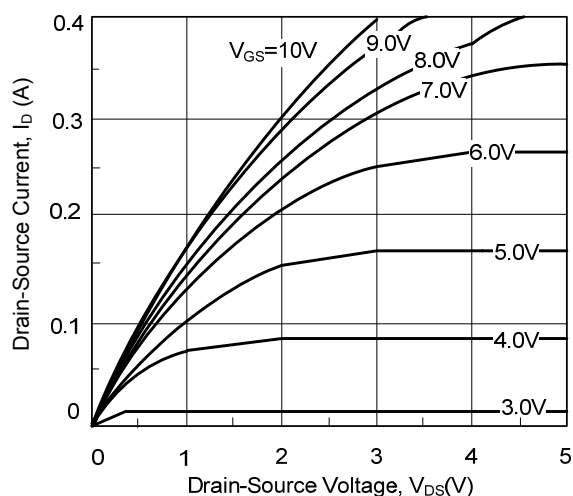


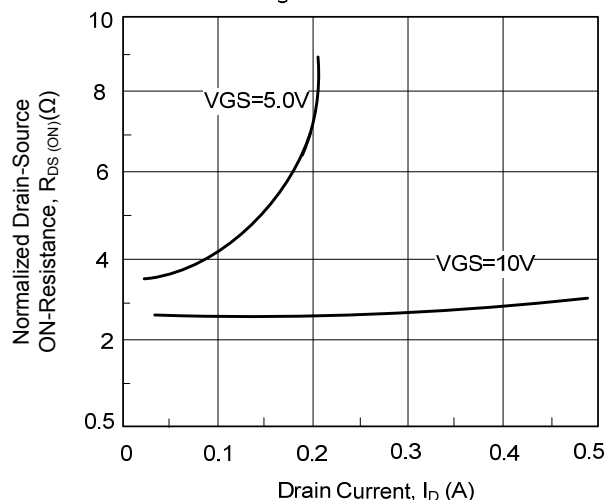
Fig. 2 Switching Waveforms

■ TYPICAL CHARACTERISTICS

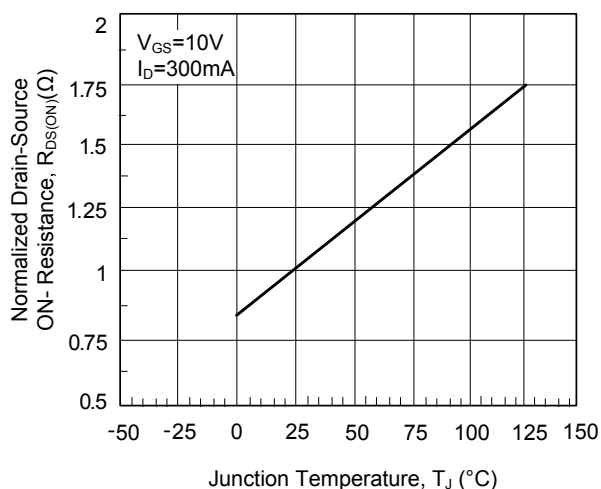
On-Resistance Characteristics



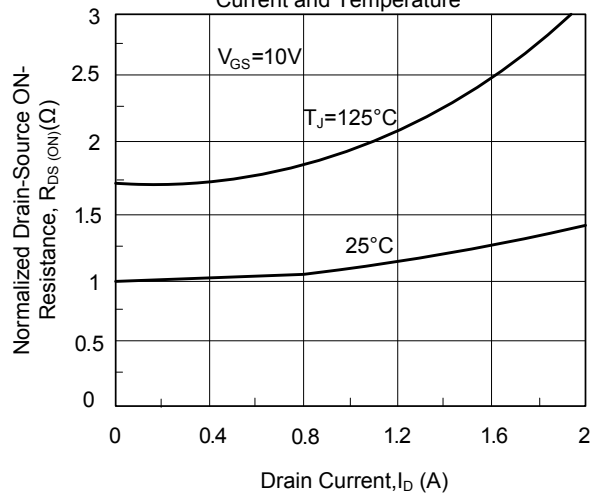
On-Resistance Variation with Gate Voltage and Drain Current



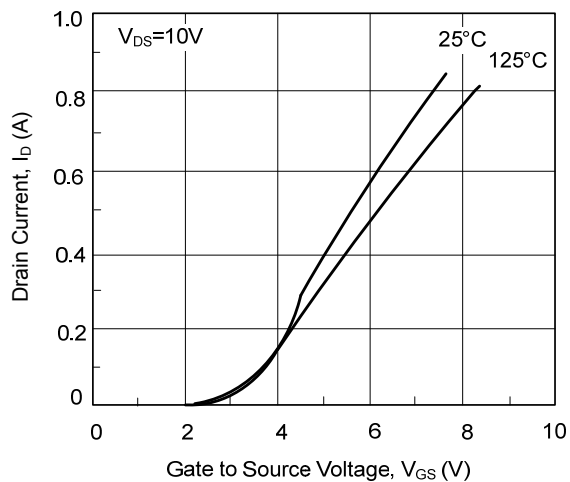
On-Resistance Variation with Temperature



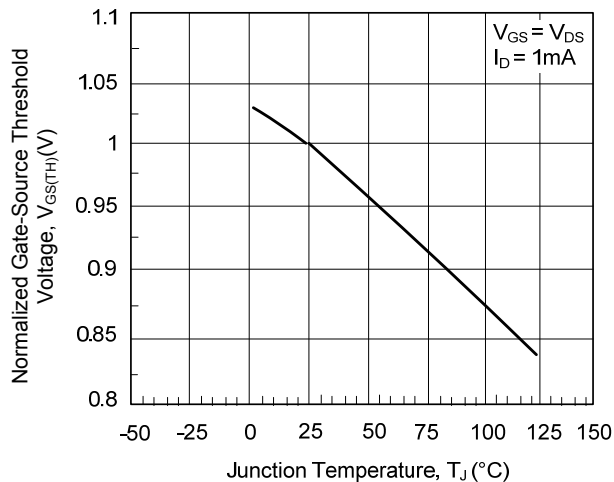
On-Resistance Variation with Drain Current and Temperature



Transfer Characteristics

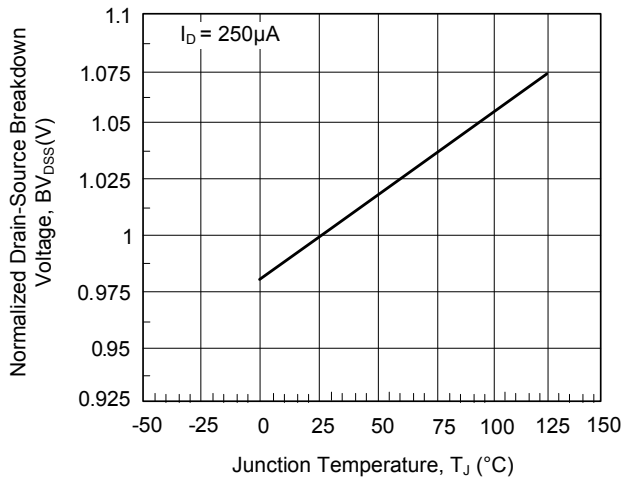


Gate Threshold Variation with Temperature

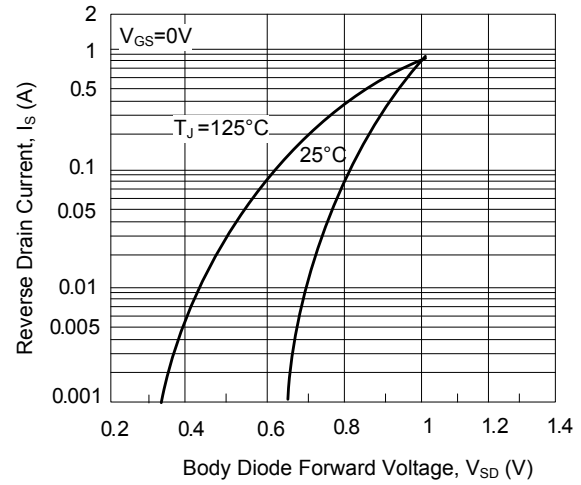


■ TYPICAL CHARACTERISTICS (Cont.)

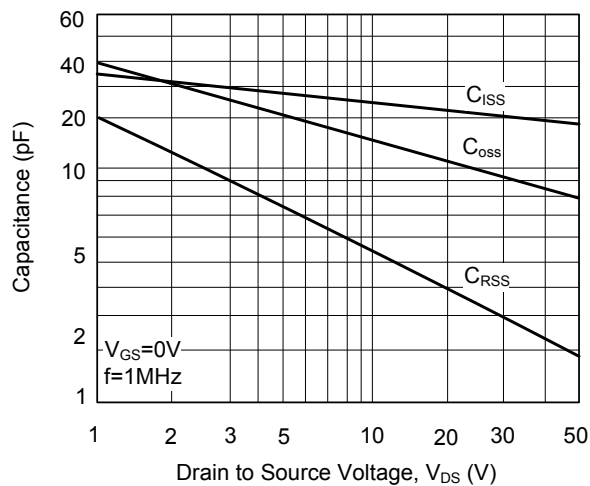
Breakdown Voltage Variation with Temperature



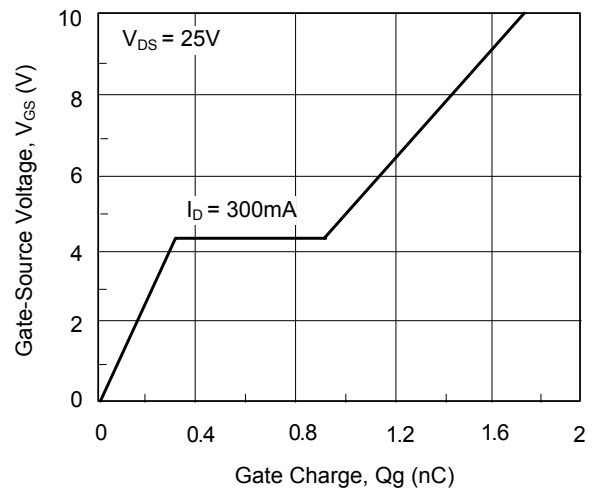
Body Diode Forward Voltage Variation with Temperature



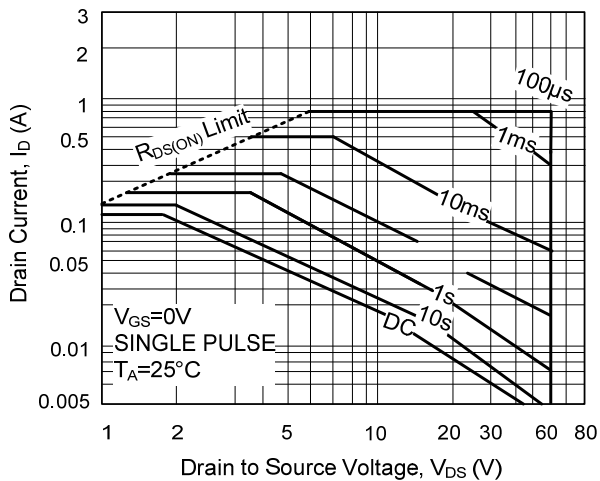
Capacitance Characteristics



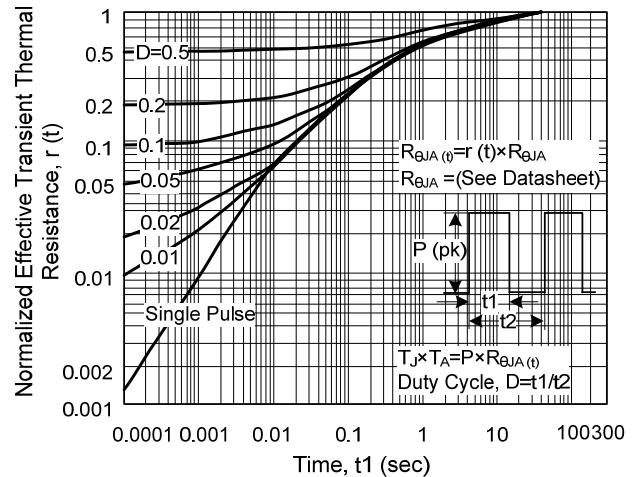
Gate Charge Characteristics



Maximum Safe Operating Area



Transient Thermal Response Curve



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