

N-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	r_{DS(on)} (Ω)	I_D (mA)
60	3 @ V _{GS} = 10 V	240

FEATURES

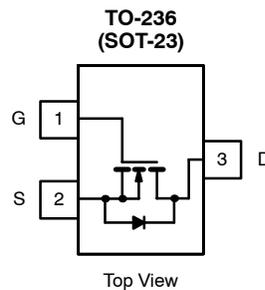
- Low On-Resistance: 3 Ω
- Low Threshold: 2 V (typ)
- Low Input Capacitance: 25 pF
- Fast Switching Speed: 7.5 ns
- Low Input and Output Leakage

BENEFITS

- Low Offset Voltage
- Low-Voltage Operation
- Easily Driven Without Buffer
- High-Speed Circuits
- Low Error Voltage

APPLICATIONS

- Direct Logic-Level Interface: TTL/CMOS
- Drivers: Relays, Solenoids, Lamps, Hammers, Display, Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays



Marking Code: 7Ew/

E = Part Number Code for 2N7002E

w = Week Code

/ = Lot Traceability

Ordering Information: 2N7002E-T1

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C UNLESS OTHERWISE NOTED)			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	60	V
Gate-Source Voltage	V _{GS}	± 20	V
Continuous Drain Current (T _J = 150 °C)	I _D	240	mA
		190	
Pulsed Drain Current ^a	I _{DM}	1300	
Power Dissipation	P _D	0.35	W
		0.22	
Thermal Resistance, Junction-to-Ambient	R _{thJA}	357	°C/W
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to 150	°C

Notes

a. Pulse width limited by maximum junction temperature.

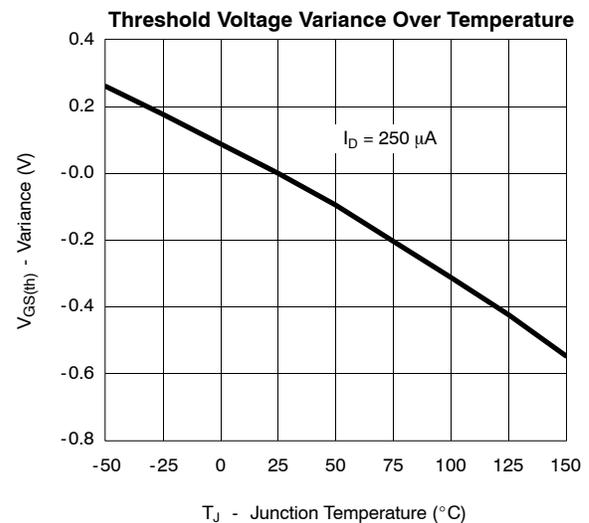
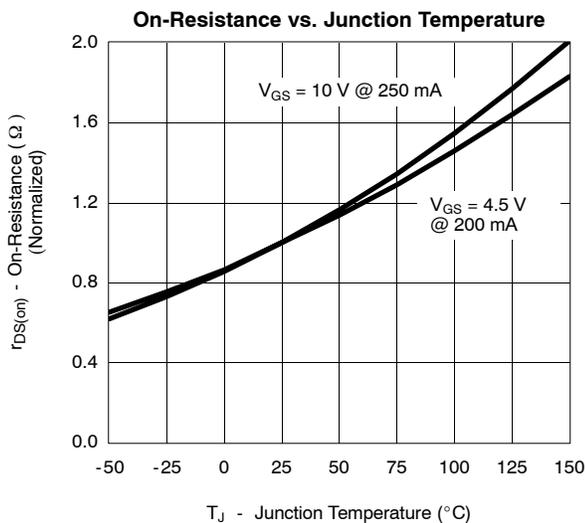
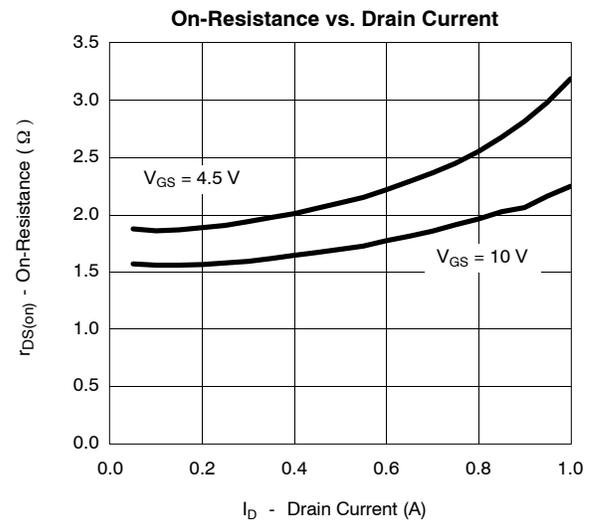
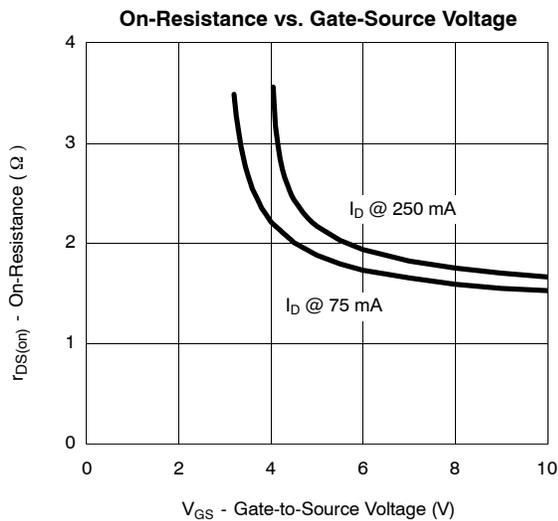
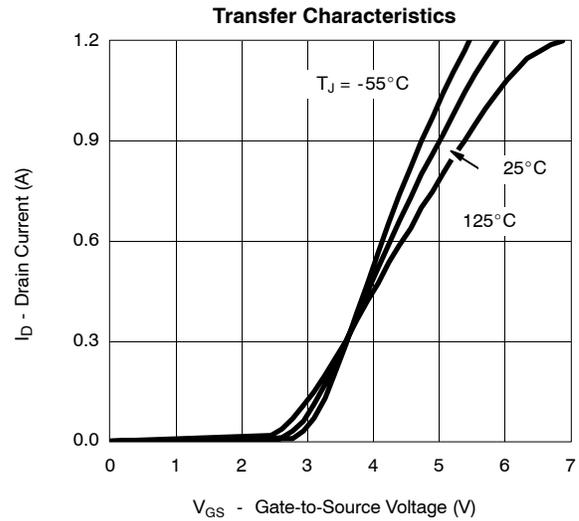
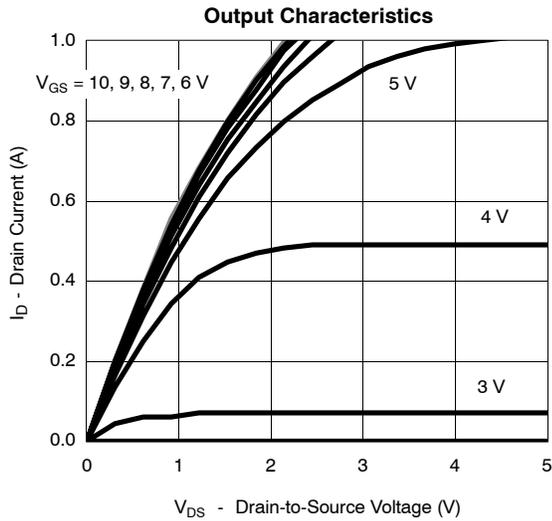
SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ ^a	Max	
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 10 μA	60	68		V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1	2	2.5	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 15 V			± 10	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V			1	μA
		V _{DS} = 60 V, V _{GS} = 0 V, T _C = 125 °C			500	
On-State Drain Current ^b	I _{D(on)}	V _{GS} = 10 V, V _{DS} = 7.5 V	800	1300		mA
		V _{GS} = 4.5 V, V _{DS} = 10 V	500	700		
Drain-Source On-Resistance ^b	r _{DS(on)}	V _{GS} = 10 V, I _D = 250 mA		1.2	3	Ω
		V _{GS} = 4.5 V, I _D = 200 mA		1.8	4	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 200 mA		600		mS
Diode Forward Voltage	V _{SD}	I _S = 200 mA, V _{GS} = 0 V		0.85	1.2	V
Dynamic^a						
Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 4.5 V I _D ≅ 250 mA		0.4	0.6	nC
Gate-Source Charge	Q _{gs}			0.06		
Gate-Drain Charge	Q _{gd}			0.06		
Input Capacitance	C _{iss}	V _{DS} = 5 V, V _{GS} = 0 V, f = 1 MHz		21		pF
Output Capacitance	C _{oss}			7		
Reverse Transfer Capacitance	C _{rss}			2.5		
Switching^{a, c}						
Turn-On Time	t _{on}	V _{DD} = 10 V, R _L = 40 Ω I _D ≅ 250 mA, V _{GEN} = 10V R _G = 10 Ω		13	20	ns
Turn-Off Time	t _{off}			18	25	

Notes

- a. For DESIGN AID ONLY, not subject to production testing.
 b. Pulse test: PW ≤ 300 μs duty cycle ≤ 2%.
 c. Switching time is essentially independent of operating temperature.

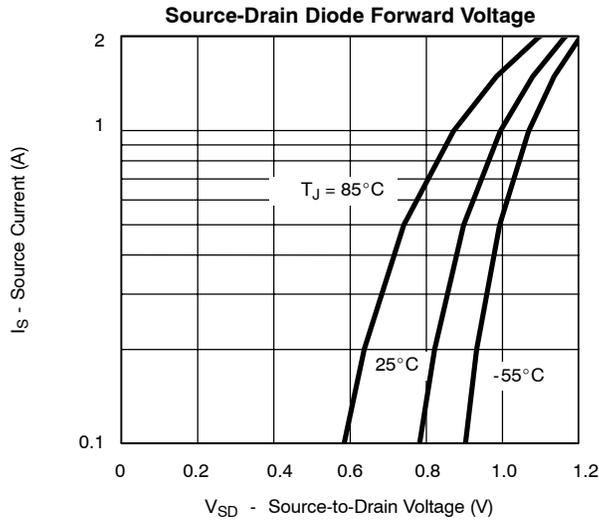
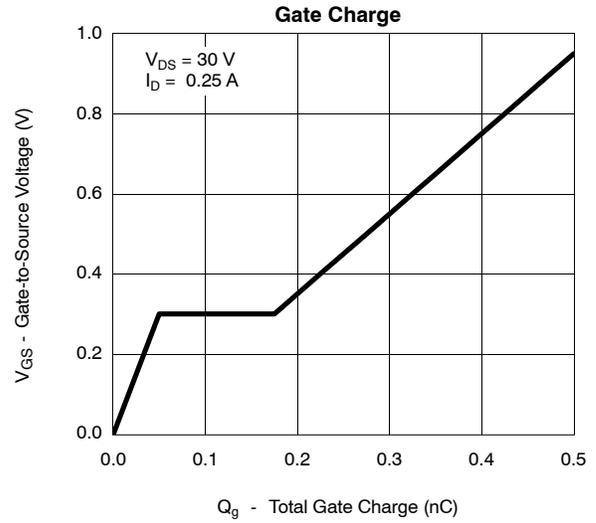
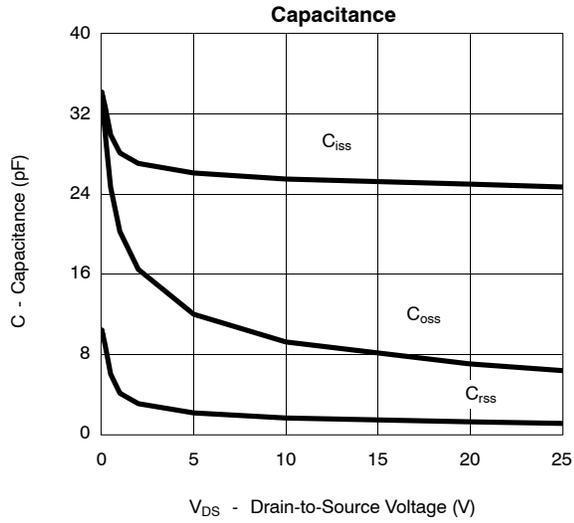


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)





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