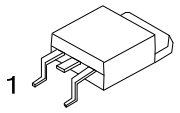
11NM70M1-U2

Power MOSFET

11A, 700V N-CHANNEL SUPER-JUNCTION MOSFET



TO-252

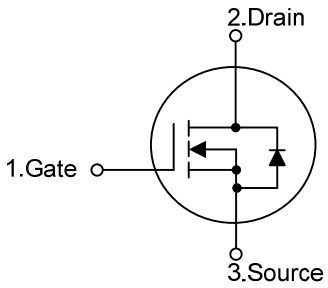
■ DESCRIPTION

The **UTC 11NM70M1-U2** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

■ FEATURES

* $R_{DS(ON)} \leq 0.6\ \Omega$ @ V_{GS}=10V, I_D=1.2A
* MSL1 Robust Package Design
* High switching Speed
* 100% avalanche tested
* Improved dv/dt capability
* Green & Pb free

■ SYMBOL



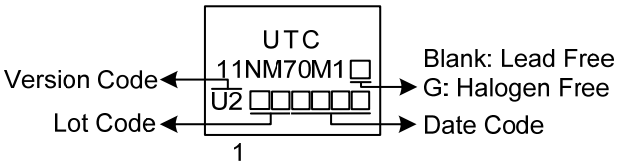
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Pb Free	Halogen Free		1	2	3	
11NM70M1-U2-TN3-R	11NM70M1G-U2-TN3-R	TO-252	G	D	S	Tape Reel

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

11NM70M1G-U2-TN3-R (1)Packing Type (2)Package Type (3)Version Code (4)Green Package	(1) R: Tape Reel (2) TN3: TO-252 (3) Version U2 (4) G: Halogen Free and Lead Free, Blank: Pb free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	700	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	Continuous	I_D	11	A
	Pulsed (Note 2)	I_{DM}	22	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	190	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	9	V/ns
Power Dissipation		P_D	55	W
Junction Temperature		T_J	+150	°C
Storage Temperature Range		T_{STG}	-55 ~ +150	°C

Notes: 1. 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.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. L = 66mH, I_{AS} = 2.4A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 11A, di/dt ≤ 100A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	110	°C/W
Junction to Case	θ_{JC}	2.27 (Note)	°C/W

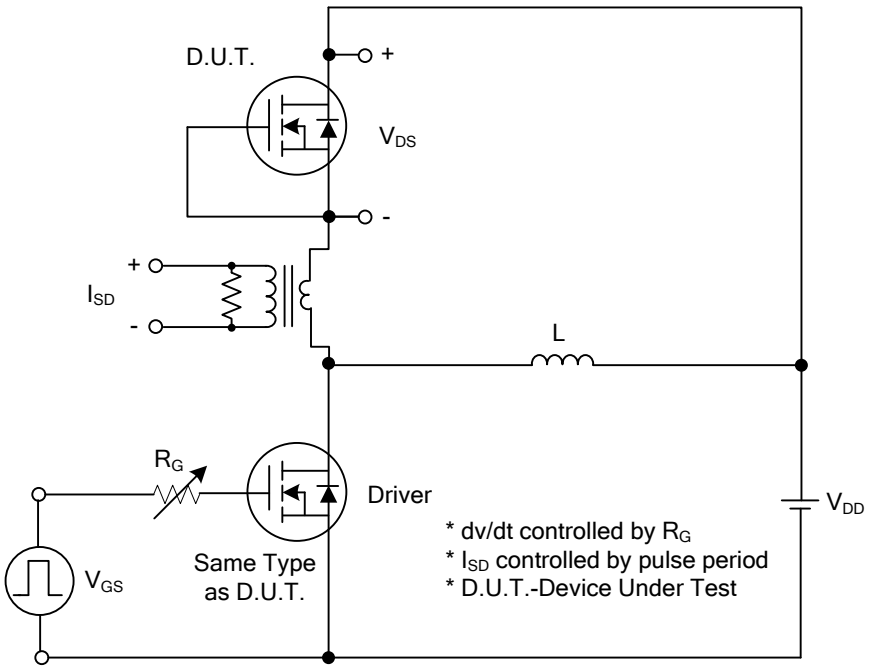
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

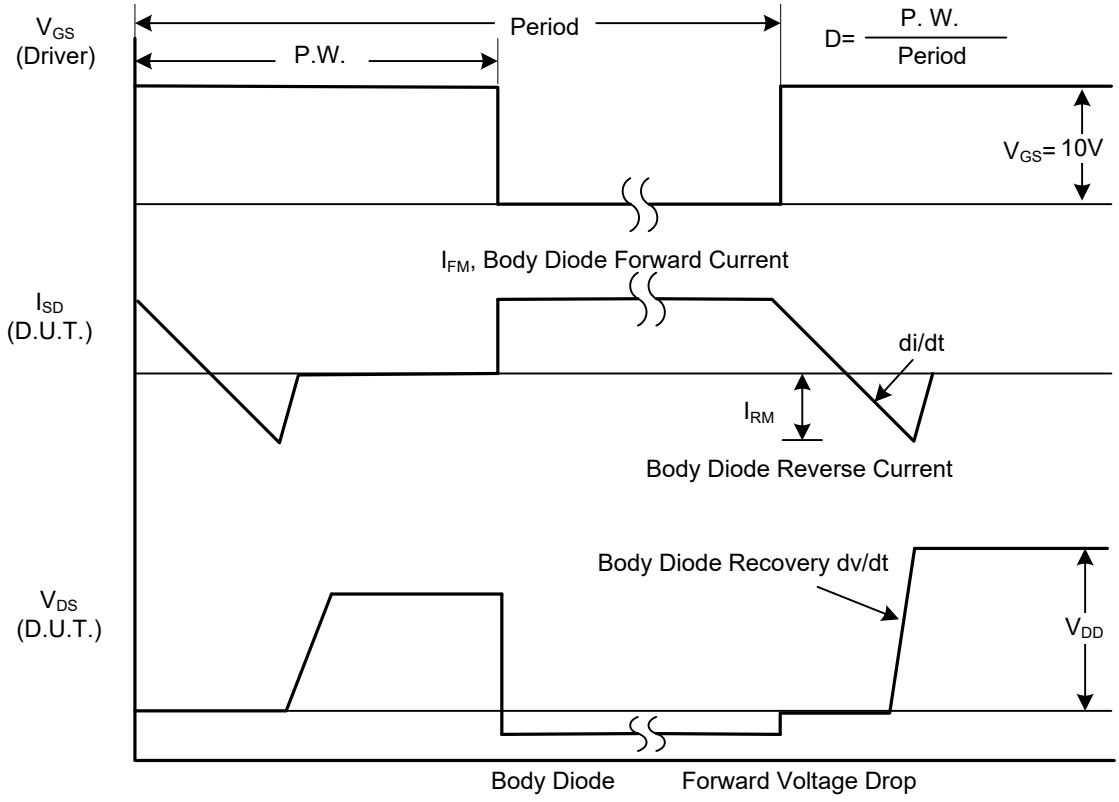
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	700			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=700V, V_{GS}=0V			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{DS}=0V ,V_{GS}=30V			100	nA
	Reverse		V_{DS}=0V ,V_{GS}=-30V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}= V_{GS}, I_D=250μA	2.5		4.5	V
Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=1.2A		0.56	0.6	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=50V, f=1.0MHz		600		pF
Output Capacitance		C_{OSS}			55		pF
Reverse Transfer Capacitance		C_{RSS}			4		pF
Gate Resistance		R_G	V_{DS} =0V, f =1MHz		2		Ω
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=100V, V_{GS}=10V, I_D=11A (Note 1, 2)		23.6		nC
Gate to Source Charge		Q_{GS}			7.6		nC
Gate to Drain Charge		Q_{GD}			8.3		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=100V, V_{GS}=10V, I_D=11A, R_G=25Ω (Note 1, 2)		10.5		ns
Rise Time		t_R			23		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			63		ns
Fall-Time		t_F			44		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				11	A
Maximum Body-Diode Pulsed Current		I_{SM}				22	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=11A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t_{rr}	I_S=11A, V_{GS}=0V, dI_F/dt=100A/μs		250		ns
Body Diode Reverse Recovery Charge		Q_{rr}			2.36		μC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

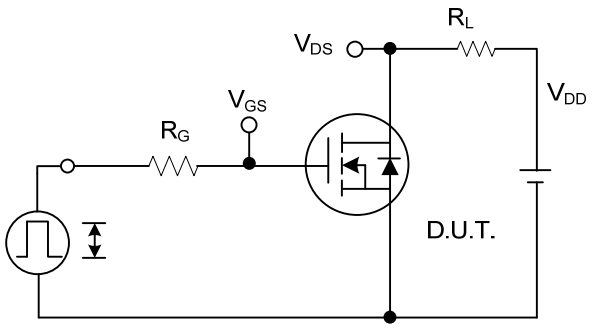


Peak Diode Recovery dv/dt Test Circuit

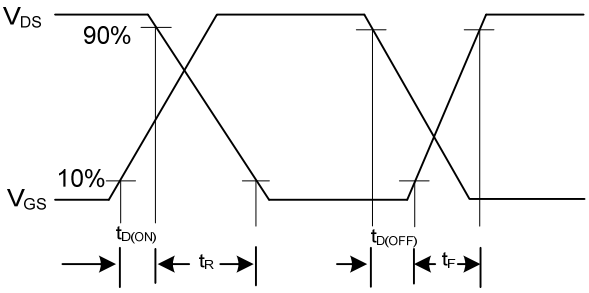


Peak Diode Recovery dv/dt Waveforms

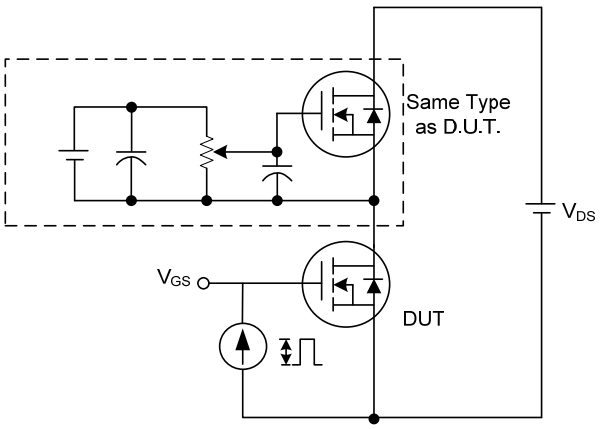
■ TEST CIRCUITS AND WAVEFORMS



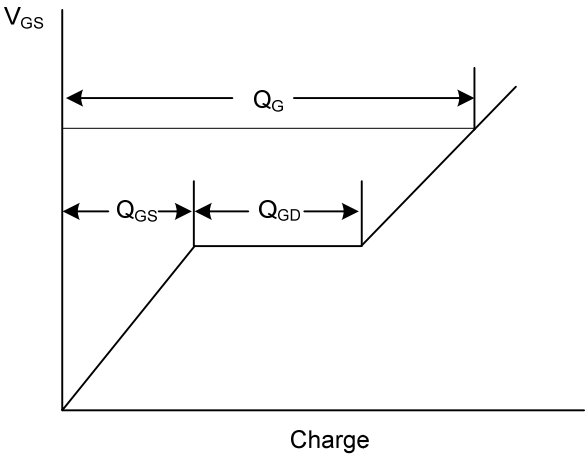
Switching Test Circuit



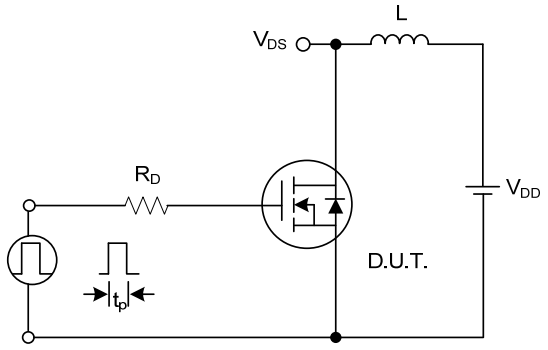
Switching Waveforms



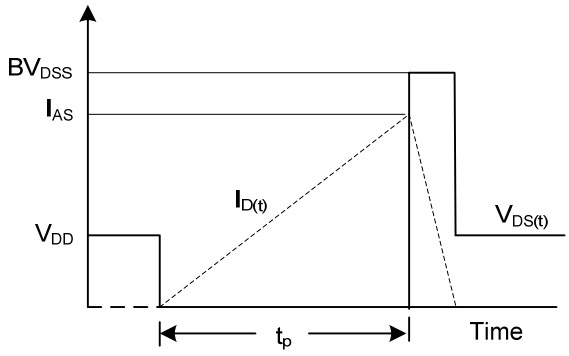
Gate Charge Test Circuit



Gate Charge Waveform

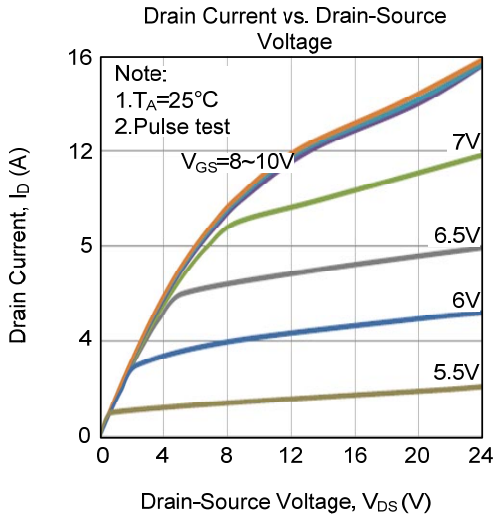


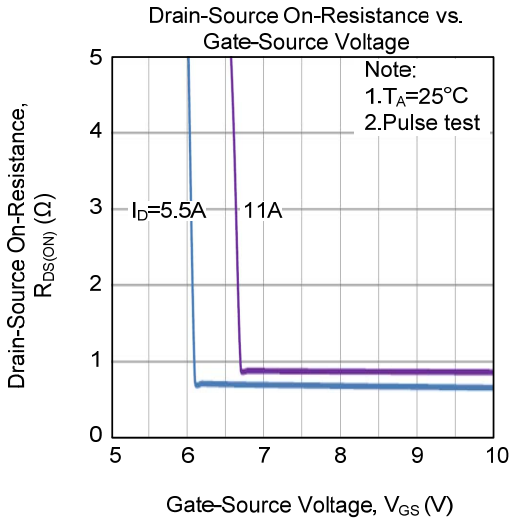
Unclamped Inductive Switching Test Circuit

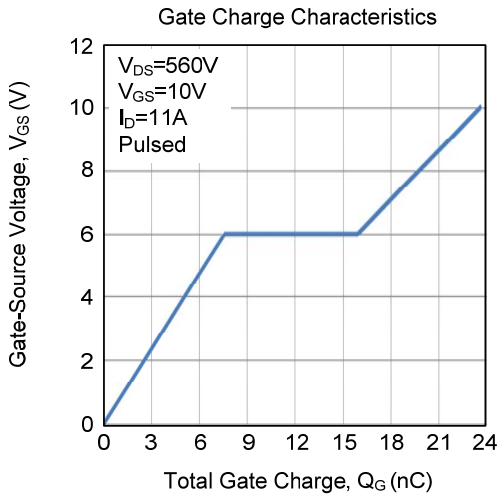


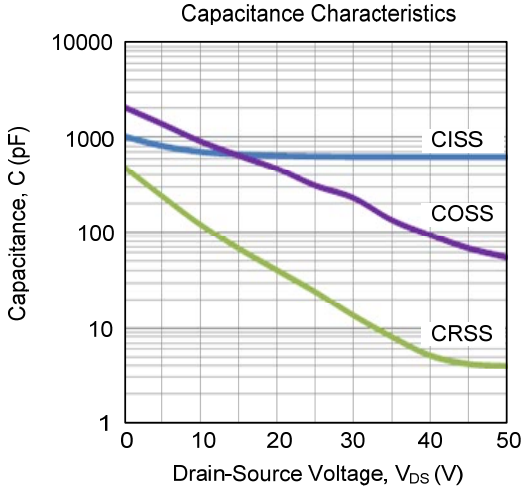
Unclamped Inductive Switching Waveforms

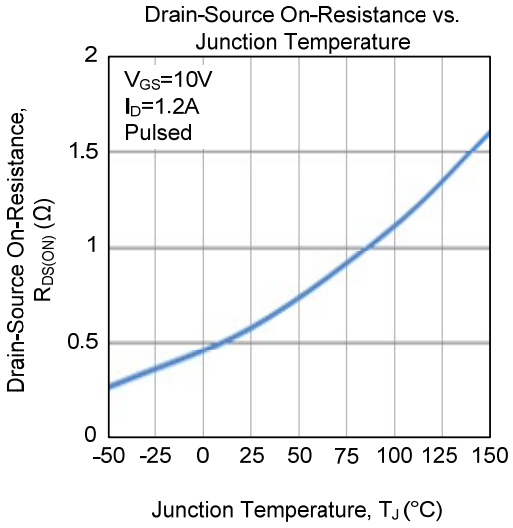
■ TYPICAL CHARACTERISTICS

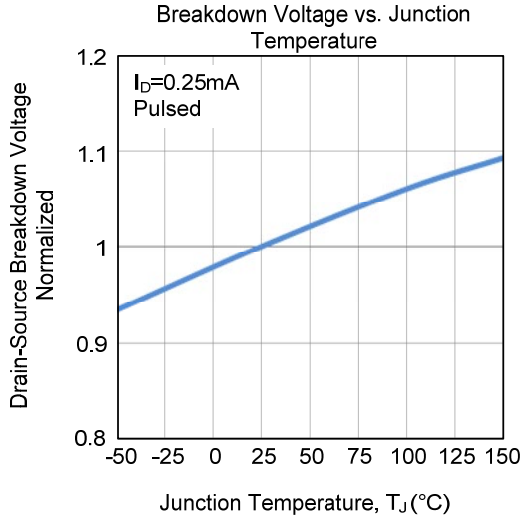






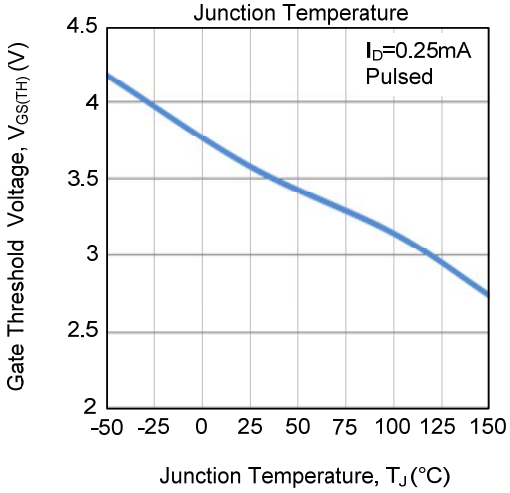




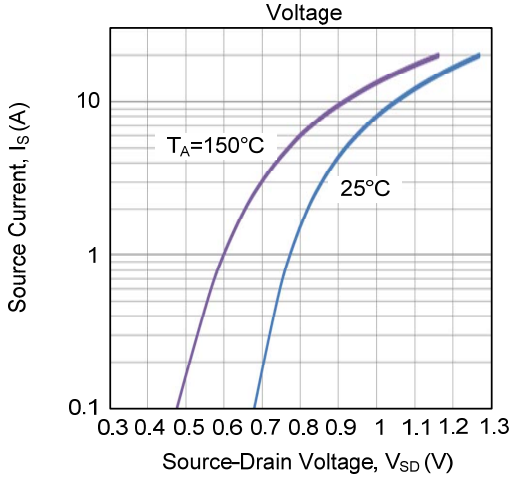


■ TYPICAL CHARACTERISTICS (Cont.)

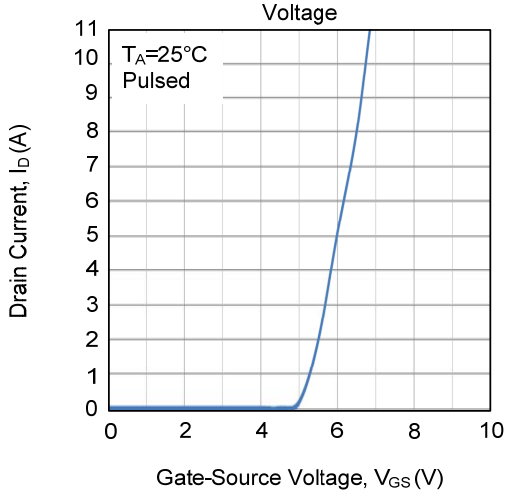
Gate Threshold Voltage vs. Junction Temperature



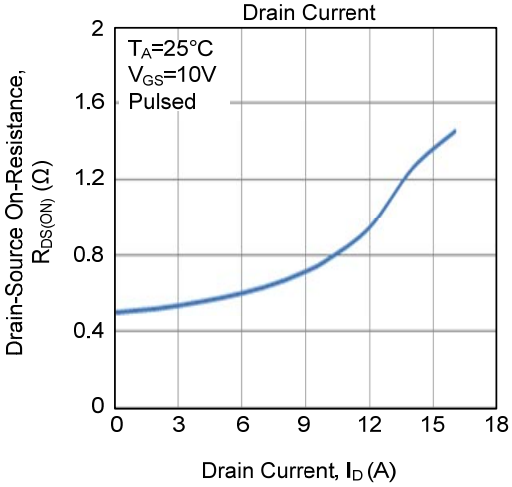
Source Current vs. Source-Drain Voltage



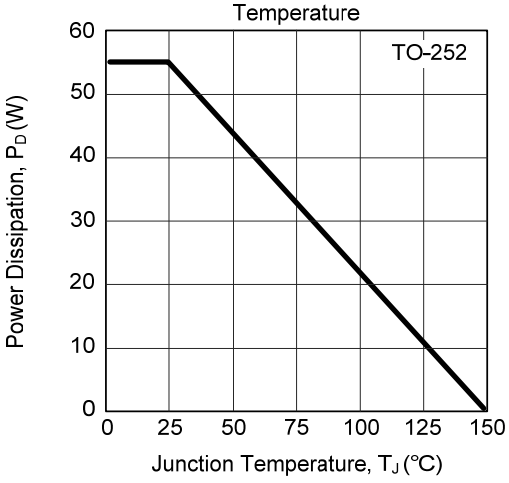
Drain Current vs. Gate-Source Voltage



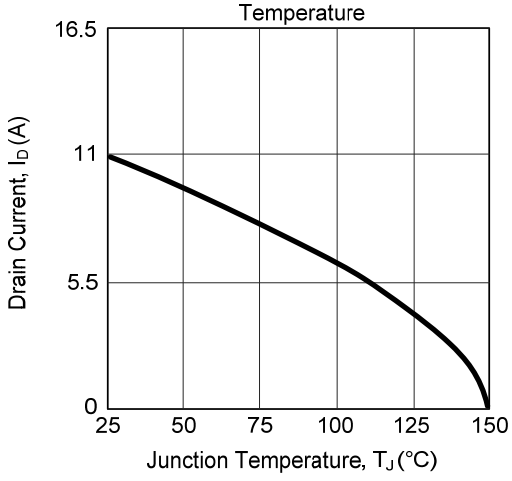
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)