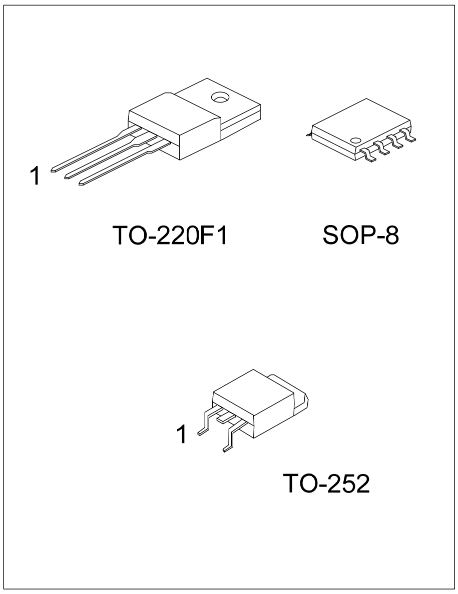
-24A, -60V P-CHANNEL POWER MOSFET



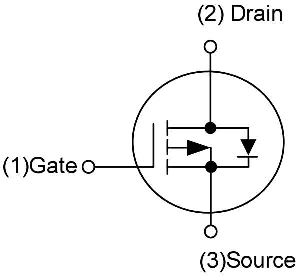
DESCRIPTION

The UTC **UT24P06H** uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

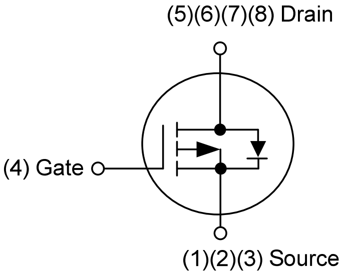
FEATURES

- * $R_{DS(ON)} \leq 40$ mΩ @ V_{GS}= -10V, I_D= -12A
- * High Switching Speed
- * 100% Avalanche Tested
- * High density cell design for ultra low $R_{DS(ON)}$

SYMBOL



TO-220F1 / TO-252

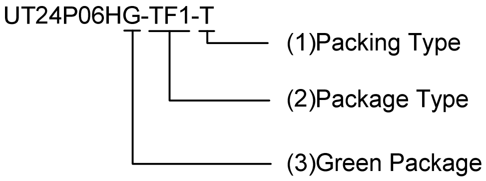


SOP-8

ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT24P06HL-TF1-T	UT24P06HG-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
UT24P06HL-TN3-R	UT24P06HG-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT24P06HL-S08-R	UT24P06HG-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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



(1) T: Tube, R: Tape Reel

(2) TF1: TO-220F1, TN3: TO-252, S08: SOP-8

(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

<table>
<tr><th>TO-220F1 / TO-252</th><th>SOP-8</th></tr>
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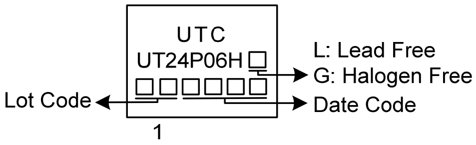

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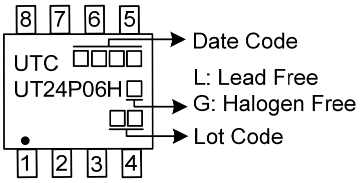

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■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER				SYMBOL	RATINGS	UNIT
Drain-Source Voltage				V_{DSS}	-60	V
Gate-Source Voltage				V_{GSS}	±20	V
Drain Current	Continuous, V_{GSS}@-10V	T_C=25°C	TO-220F1 TO-252	I_D	-24	A
			SOP-8		-9	A
		T_C=100°C	TO-220F1 TO-252		-48	A
			SOP-8		-6.4	A
	Pulsed (Note 2)		TO-220F1 TO-252	I_{DM}	-48	A
			SOP-8		-14.4	A
Avalanche Energy	Repetitive (Note 3)			E_{AS}	27.5	mJ
Peak Diode Recovery dv/dt (Note 4)				dv/dt	10.1	V/ns
Power Dissipation (T_C=25°C)			TO-220F1	P_D	30	W
			TO-252		44	W
			SOP-8		3	W
Junction Temperature				T_J	+150	°C
Storage Temperature				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 = 0.1mH, I_{AS} = -23.5A, V_{DD} = -50V, R_G = 25Ω, Starting T_J = 25°C
4. $I_{SD} \leq$ -24A, di/dt ≤ 200A/μs, $V_{DD} \leq BV_{DSS}$, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1	θ_{JA}	62.5	°C/W
	TO-252		110	°C/W
	SOP-8		125	°C/W
Junction to Case	TO-220F1	θ_{JC}	4.16	°C/W
	TO-252		2.85 (Note)	°C/W
	SOP-8		41.7 (Note)	°C/W

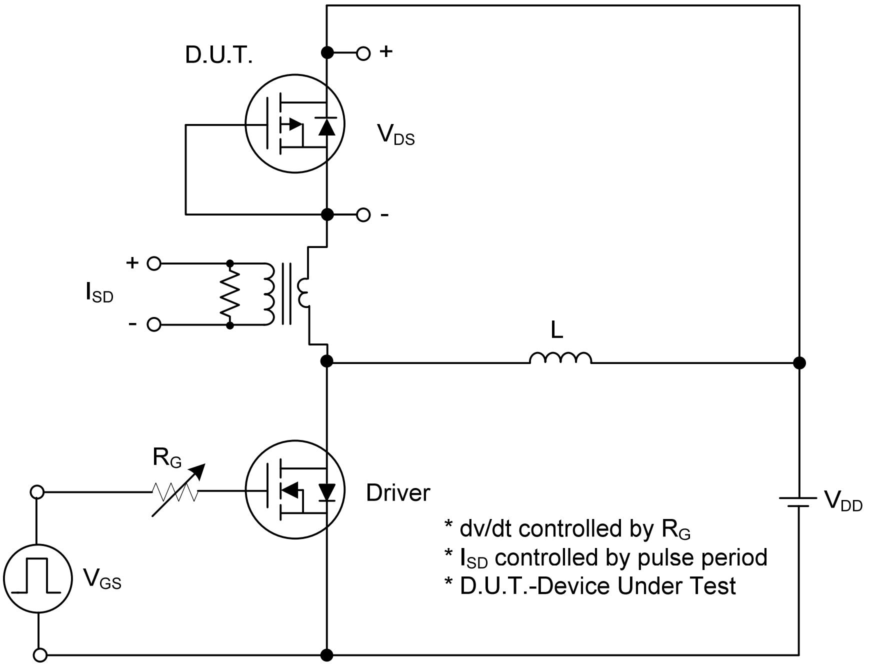
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

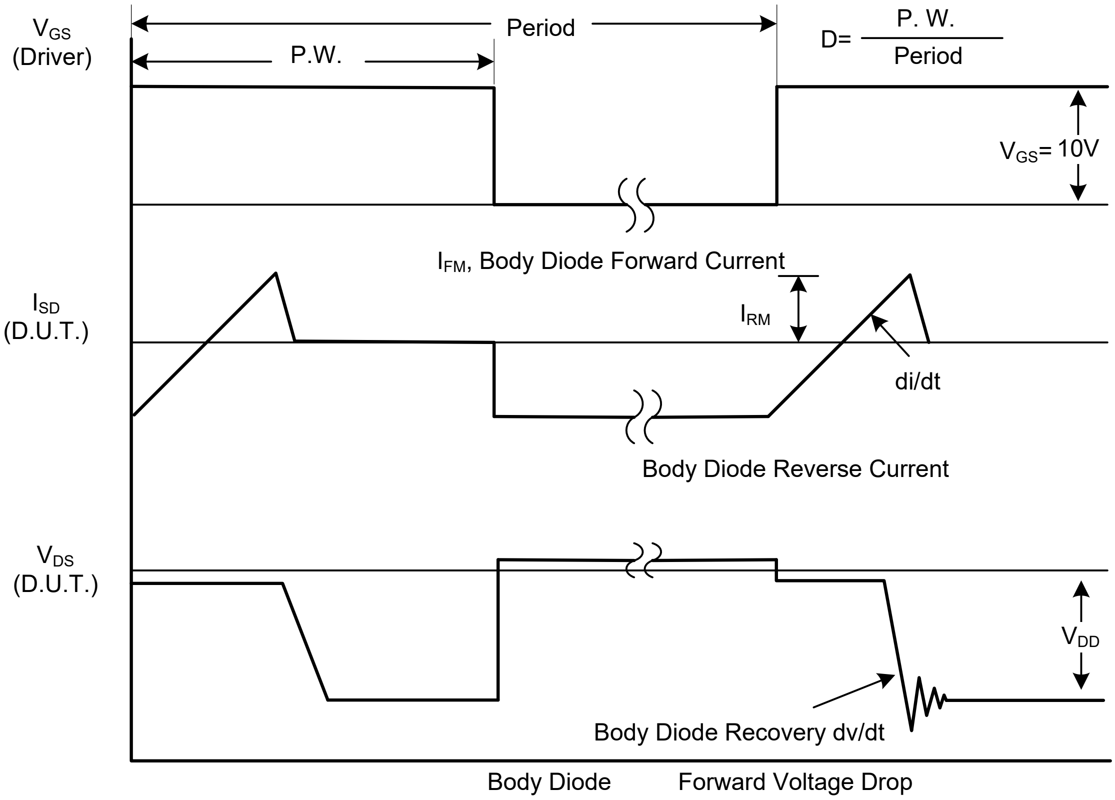
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=-250μA, V_{GS}=0V	-100			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-100V, V_{GS}=0V			-1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V ,V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=-250μA	-2.0		-4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=-10V, I_D=-12A		34	40	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=-25V, V_{GS}=0V, f=1MHz		1461		pF
Output Capacitance		C_{OSS}			140		pF
Reverse Transfer Capacitance		C_{RSS}			115		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=-48V, V_{GS}=-10V, I_D=-24A		35		nC
Gate to Source Charge		Q_{GS}			6		nC
Gate to Drain ("Miller") Charge		Q_{GD}			11		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD} =-30V, V_{GS}=-10V, I_D=-24A, R_G=3Ω (Note 1, 2)		11		ns
Rise Time		t_R			19		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			35		ns
Fall-Time		t_F			24		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				-24	A
Maximum Body-Diode Pulsed Current (Note 1)		I_{SM}				-46	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=-24A, V_{GS}=0V (Note 2)			-1.4	V
Body Diode Reverse Recovery Time (Note 1)		t_{rr}	I_S=-24A, V_{GS}=0V, dI_F/dt=100A/μs		72		ns
Body Diode Reverse Recovery Charge		Q_{rr}			90		nC

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

■ TEST CIRCUITS AND WAVEFORMS

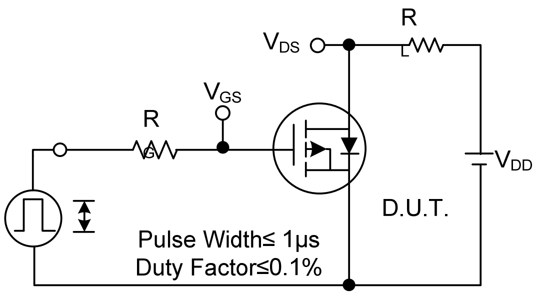


Peak Diode Recovery dv/dt Test Circuit

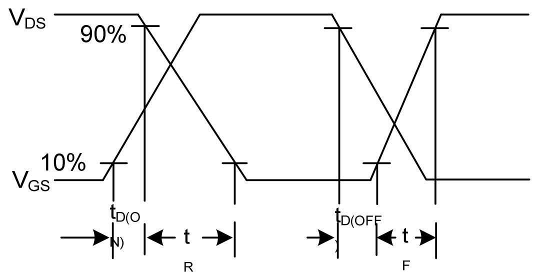


Peak Diode Recovery dv/dt Waveforms

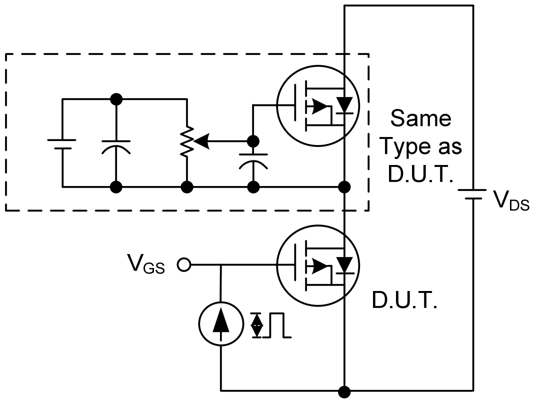
■ TEST CIRCUITS AND WAVEFORMS



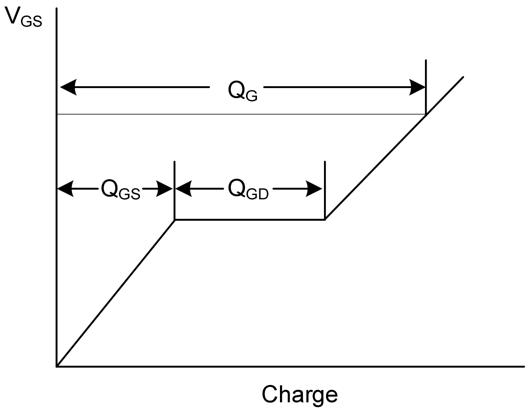
Switching Test Circuit



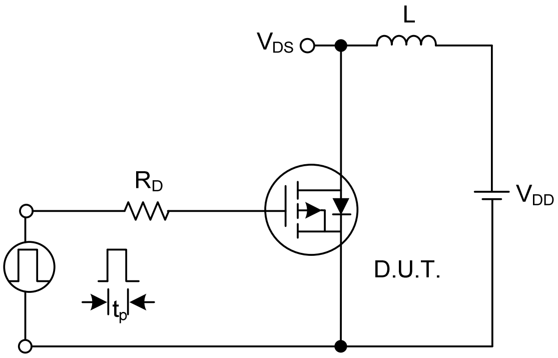
Switching Waveforms



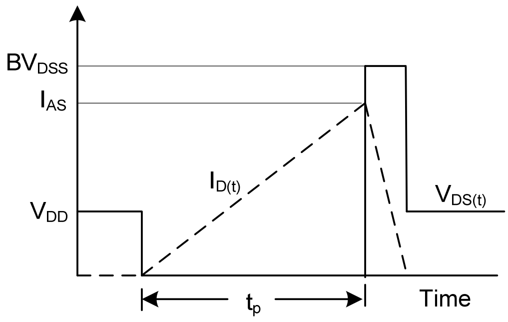
Gate Charge Test Circuit



Gate Charge Waveform

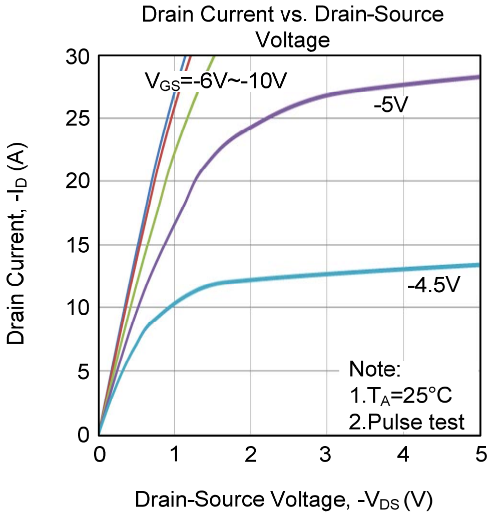


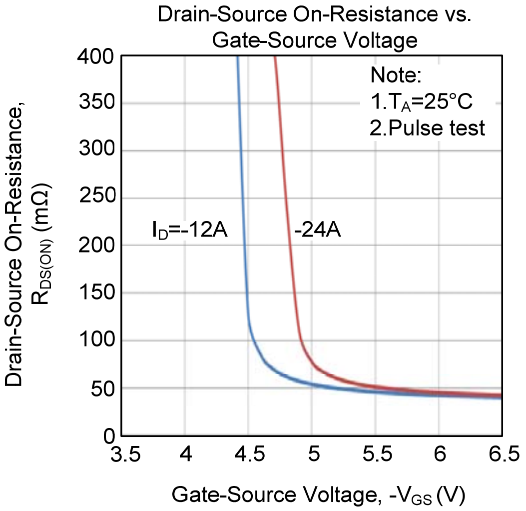
Unclamped Inductive Switching Test Circuit

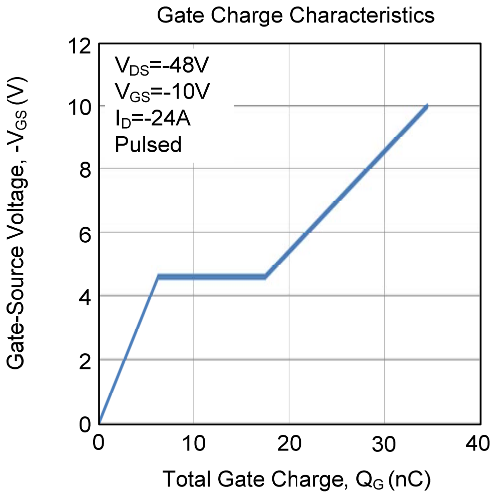


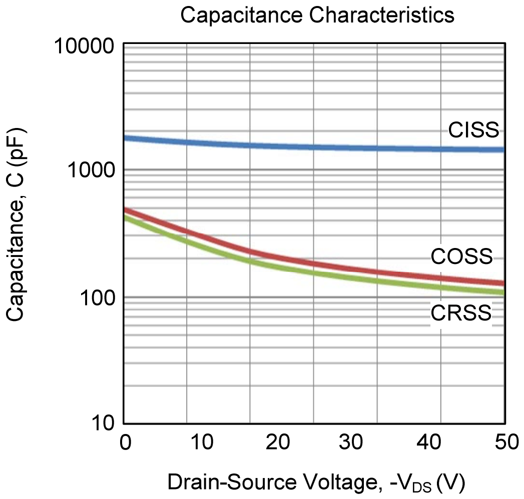
Unclamped Inductive Switching Waveforms

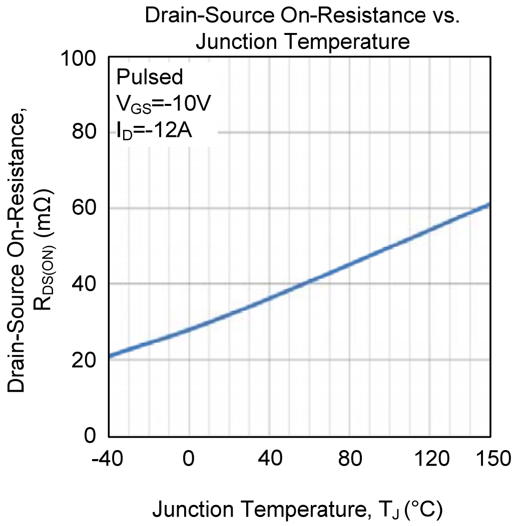
■ TYPICAL CHARACTERISTICS

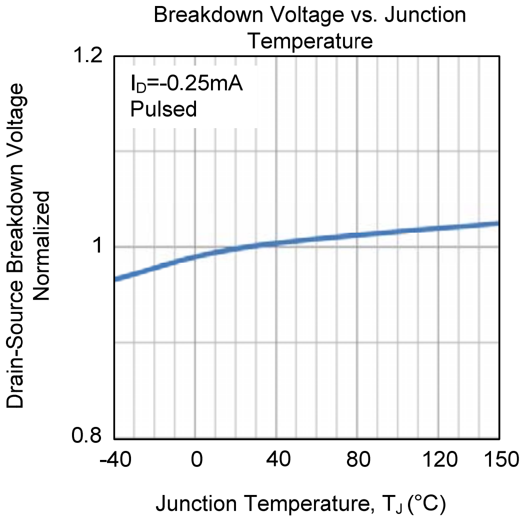






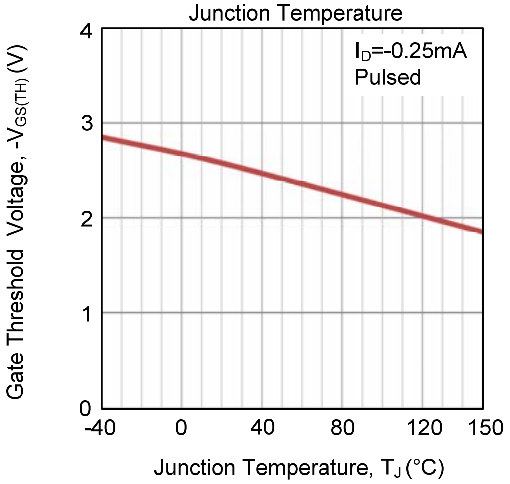




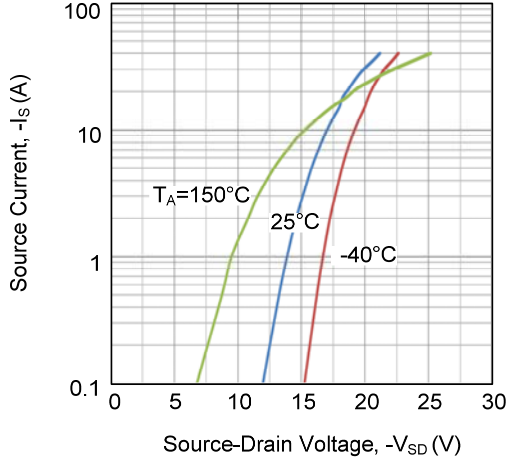


■ TYPICAL CHARACTERISTICS (Cont.)

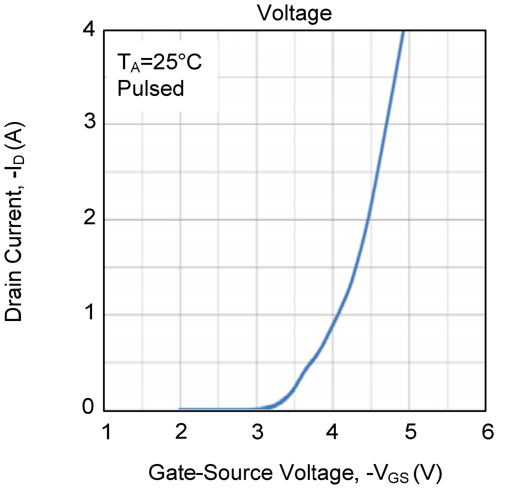
Gate Threshold Voltage vs. Junction Temperature



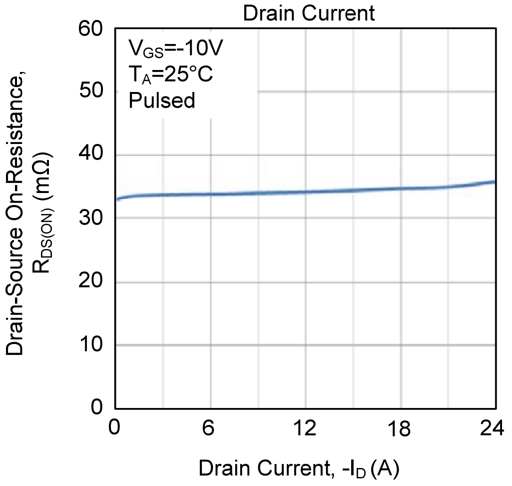
Source Current vs. Source-Drain Voltage



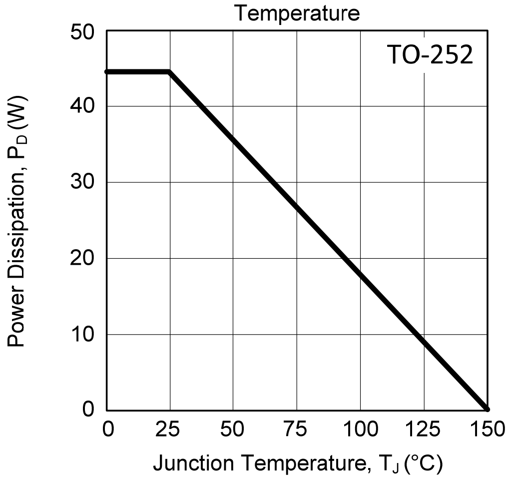
Drain Current vs. Gate-Source Voltage



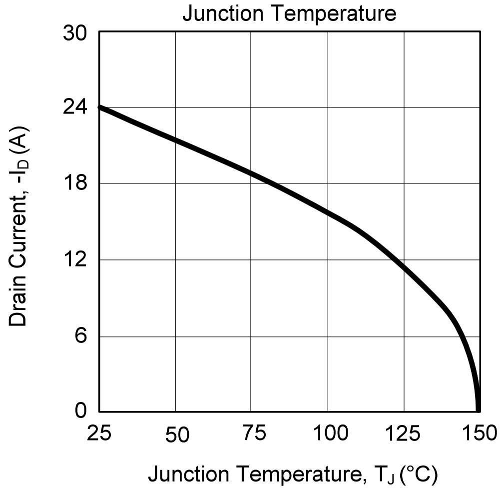
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)