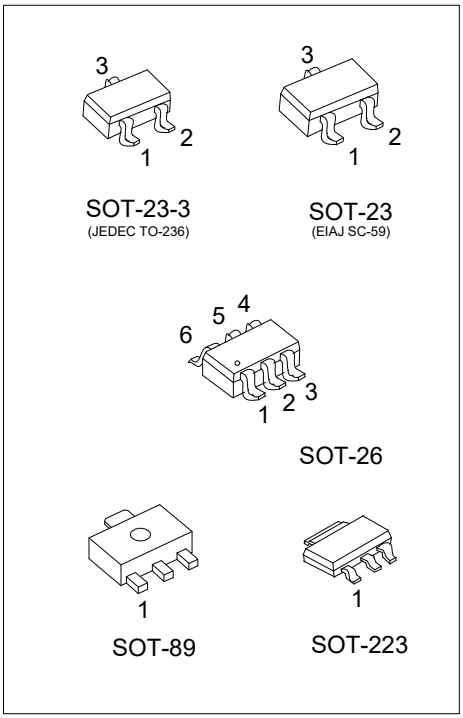
UT2P06

Power MOSFET

-2.0A, -60V (D-S) P-CHANNEL POWER MOSFET



■ DESCRIPTION

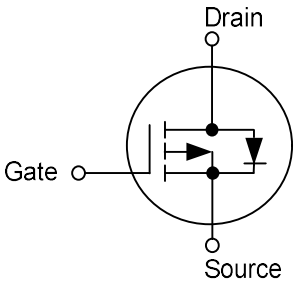
The UTC **UT2P06** is a P-channel enhancement power MOSFET using UTC's advanced technology to provide the customers with perfect $R_{DS(ON)}$ and low gate charge.

This UTC **UT2P06** can be operated with -4.5V low gate voltage.

■ FEATURES

* $R_{DS(ON)}$ ≤ 175 mΩ @ V_{GS}= -10V, I_D= -0.9A
  $R_{DS(ON)}$ ≤ 230 mΩ @ V_{GS}= -4.5V, I_D= -0.8A
* High switching speed

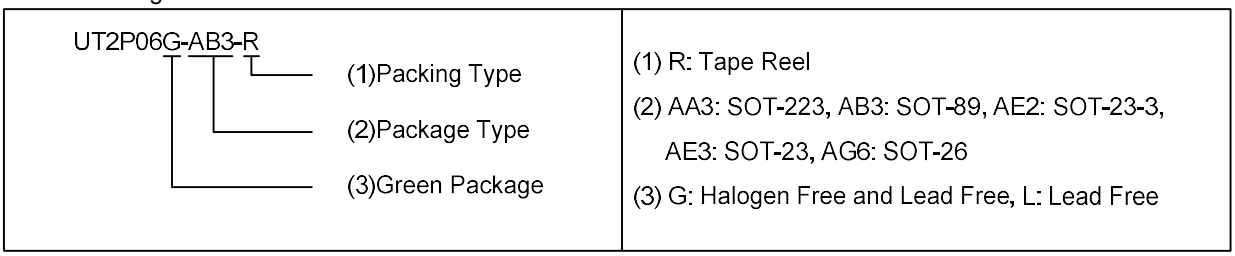
■ SYMBOL



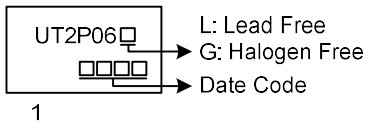
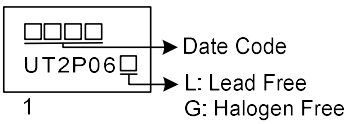
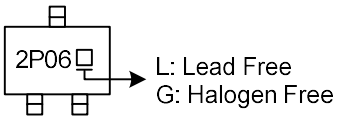
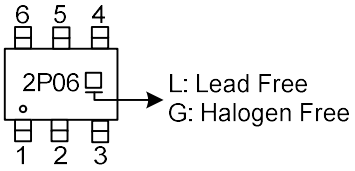
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment						Packing
Lead Free	Halogen Free		1	2	3	4	5	6	
UT2P06L-AB3-R	UT2P06G-AB3-R	SOT-89	G	D	S	-	-	-	Tape Reel
UT2P06L-AA3-R	UT2P06G-AA3-R	SOT-223	G	D	S	-	-	-	Tape Reel
UT2P06L-AE2-R	UT2P06G-AE2-R	SOT-23-3	G	S	D	-	-	-	Tape Reel
UT2P06L-AE3-R	UT2P06G-AE3-R	SOT-23	G	S	D	-	-	-	Tape Reel
UT3N06L-AG6-R	UT3N06G-AG6-R	SOT-26	D	D	G	S	D	D	Tape Reel

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



■ MARKING

SOT-223	SOT-89
	
SOT-23-3 / SOT-23	**SOT-26**
	

■ ABSOLUTE MAXIMUM RATINGS (T_A=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		I_D	-2	A
	Pulsed		I_{DM}	-6.03	A
Avalanche Current (L=0.1mH)			I_{AR}	-7	A
Power Dissipation (Note 1, 2)	(Note 4a)	SOT-23-3 SOT-23	P_D	0.5	W
	(Note 4b)	SOT-23-3 SOT-23		0.46	W
Power Dissipation (Note 1, 2)		SOT-223		3.0	W
		SOT-26		0.5	W
		SOT-89		0.7	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. Surface Mounted on FR4 Board.
3. t ≤ 5 sec.
4. θ_{JA} is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. θ_{JC} is guaranteed by design while θ_{CA} is determined by the user's board design.

a. 250°C/W when mounted on a 0.02 in2 pad of 2 oz. copper.

b. 270°C/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

■ THERMAL DATA (NOTE.)

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	θ_{JA}	41.6	°C/W
	SOT-23-3 SOT-23/SOT-26		320	°C/W
	SOT-89		178	°C/W

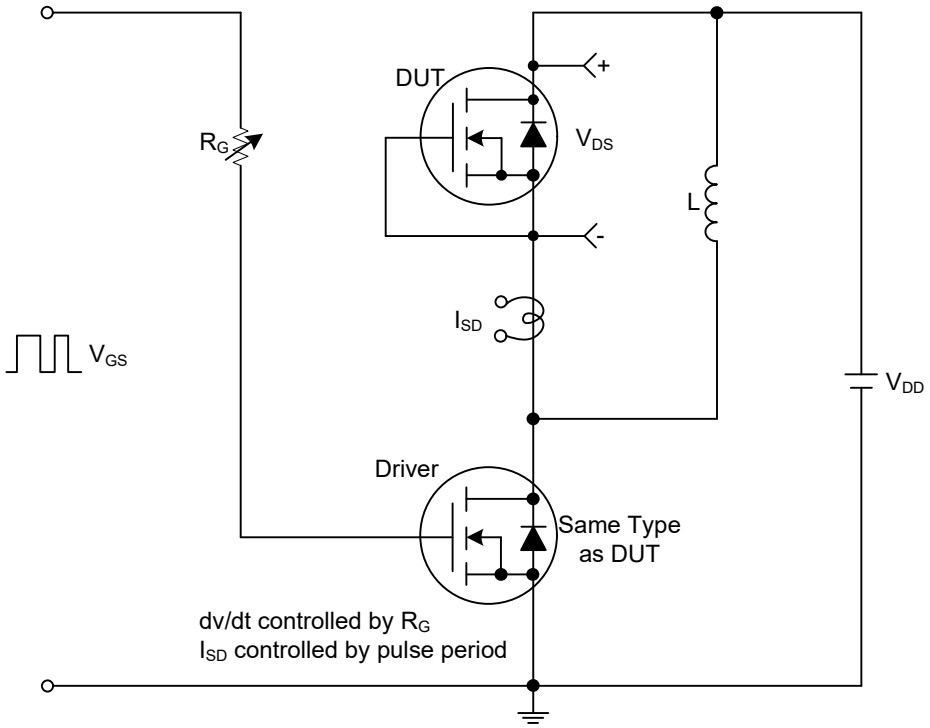
Note: Pulse width ≤ 300μs; duty cycle ≤ 2%. The pulse current is limited by the maximum junction temperature.

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

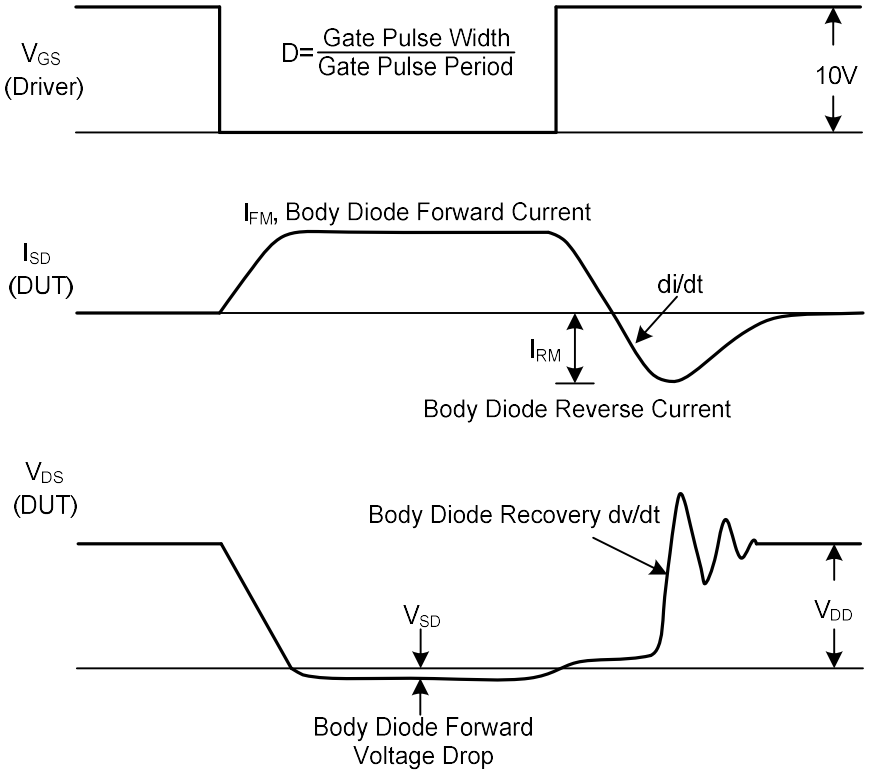
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=-250μA, V_{DS}=0V	-60			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-60V, V_{GS}=0V			-0.5	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=-250μA	-1.0		-3.0	V
Static Drain-Source On-State Resistance (Note 1)		$R_{DS(ON)}$	V_{GS}=-10V, I_D=-0.9A			175	mΩ
			V_{GS}=-4.5V, I_D=-0.8A			230	mΩ
DYNAMIC PARAMETERS							
Input Capacitance (Note 3)		C_{ISS}	V_{GS}=0V, V_{DS}=-25V, f=1.0MHz		545		pF
Output Capacitance (Note 3)		C_{OSS}			43		pF
Reverse Transfer Capacitance (Note 3)		C_{RSS}			31		pF
SWITCHING PARAMETERS (Note 2)							
Total Gate Charge (Note 3)		Q_G	V_{GS}=-10V, V_{DS}=-48V, I_D=-2A I_G=-1mA		16		nC
Gate to Source Charge (Note 3)		Q_{GS}			3.6		nC
Gate to Drain Charge (Note 3)		Q_{GD}			3		nC
Turn-ON Delay Time (Note 2, 3)		$t_{D(ON)}$	V_{DD}=-30V, V_{GS}=-10V, I_D=-2A, R_G≈6Ω		4		ns
Rise Time (Note 2, 3)		t_R			16		ns
Turn-OFF Delay Time (Note 2, 3)		$t_{D(OFF)}$			19		ns
Fall-Time (Note 2, 3)		t_F			18		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS (Note 2)							
Maximum Body-Diode Continuous Current		I_S	T_A=25°C (Note 2)			-1.42	A
Maximum Body-Diode Pulsed Current		I_{SM}	T_A=25°C (Note 3)			-6.03	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=-0.8A, V_{GS}=0V		-0.85	-0.95	V
Reverse Recovery Time		t_{rr}	I_F=-2.0A, di/dt=100A/μs		66		ns
Reverse Recovery Charge		Q_{rr}			63		nC

Notes: 1. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
2. Switching characteristics are independent of operating junction temperature.
3. For design aid only, not subject to production testing.

■ TEST CIRCUITS AND WAVEFORMS



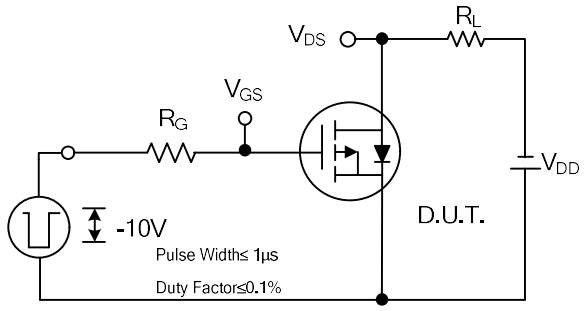
Peak Diode Recovery dv/dt Test Circuit



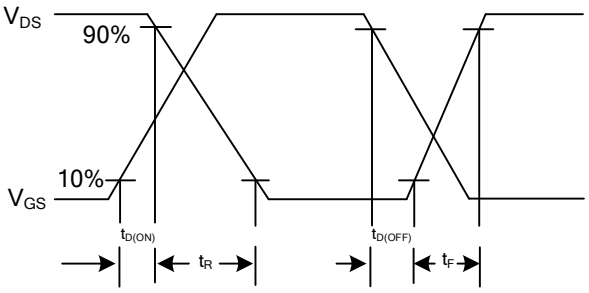
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

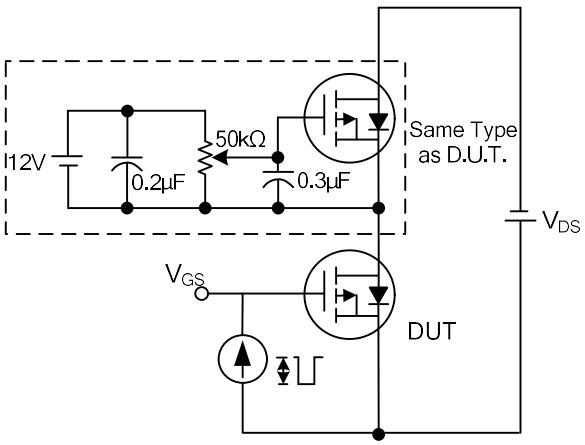
■ TEST CIRCUITS AND WAVEFORMS



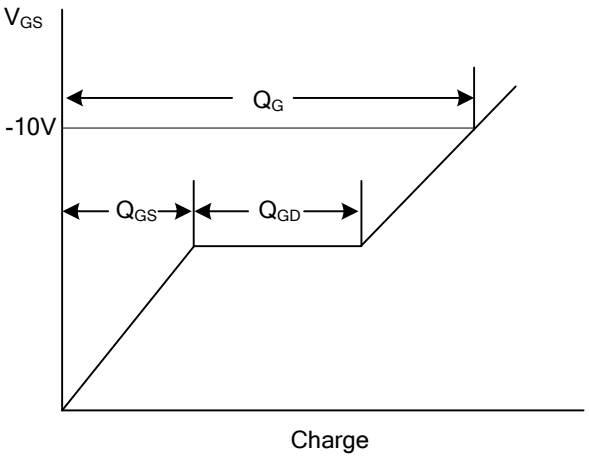
Switching Test Circuit



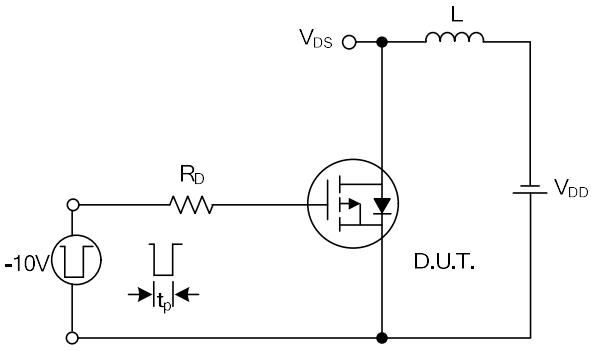
Switching Waveforms



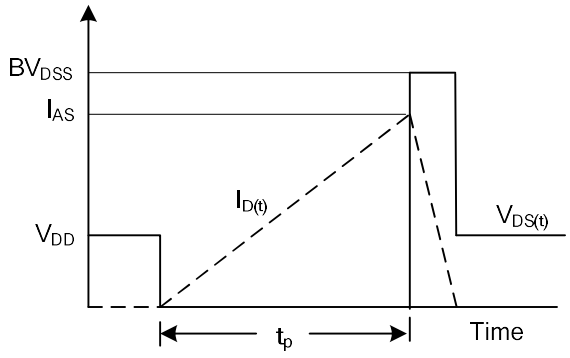
Gate Charge Test Circuit



Gate Charge Waveform

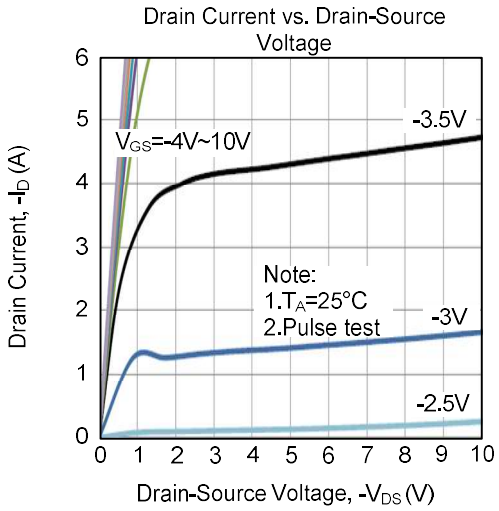


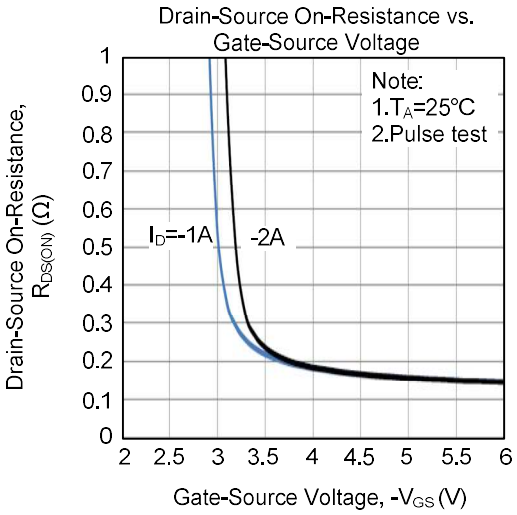
Unclamped Inductive Switching Test Circuit

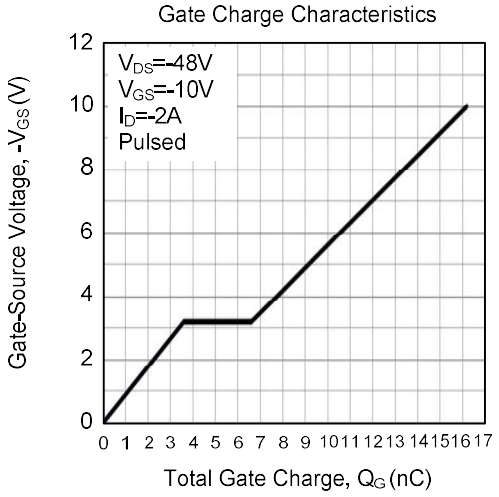


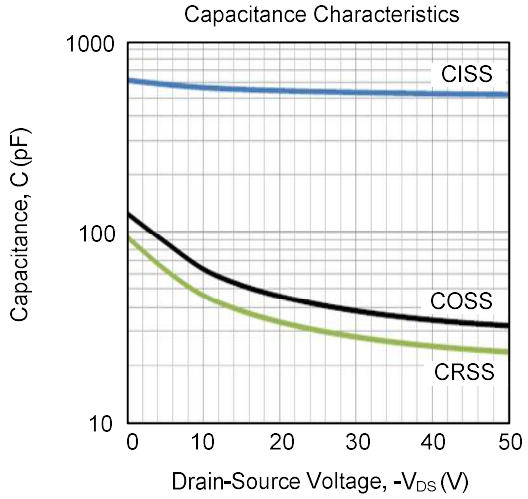
Unclamped Inductive Switching Waveforms

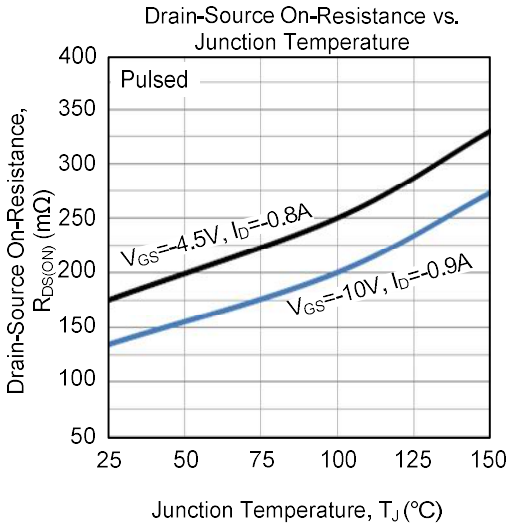
■ TYPICAL CHARACTERISTICS

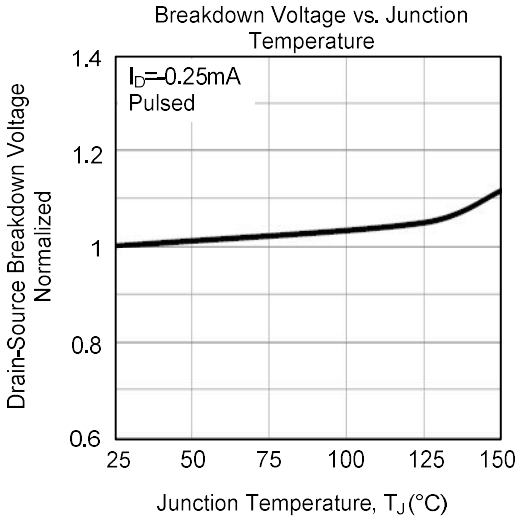






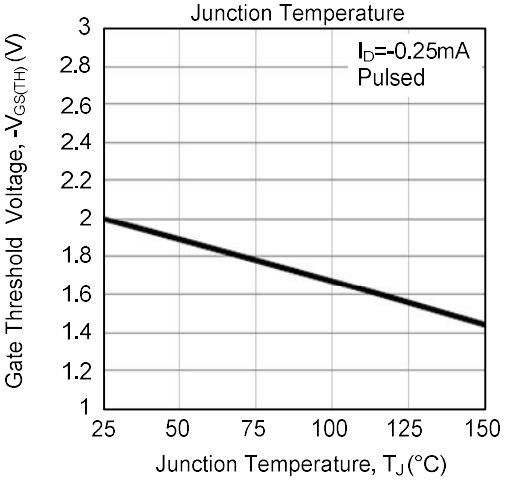




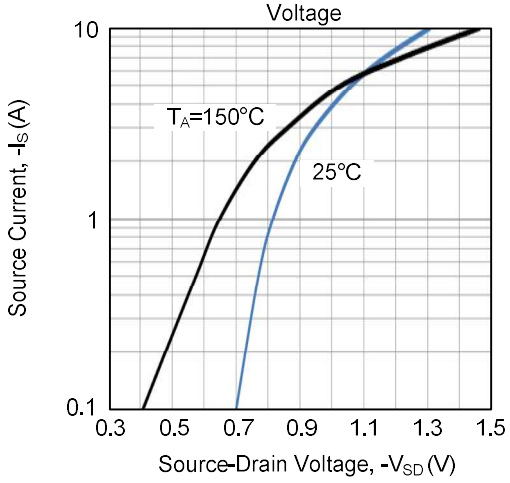


■ TYPICAL CHARACTERISTICS (Cont.)

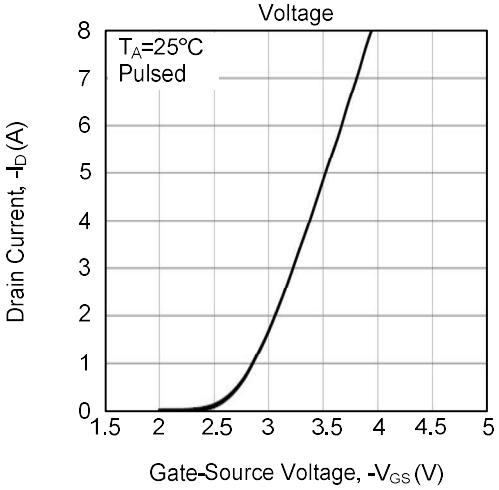
Gate Threshold Voltage vs. Junction Temperature



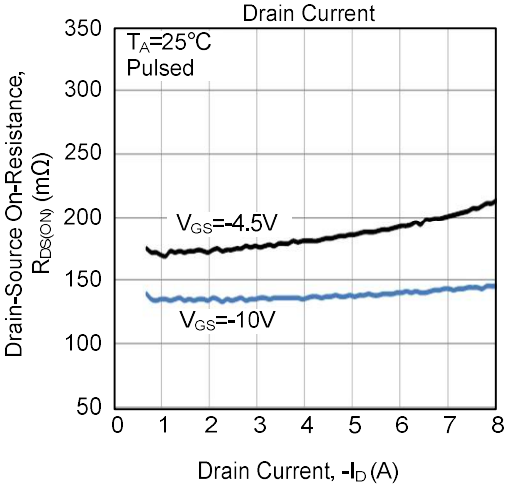
Source Current vs. Source-Drain Voltage



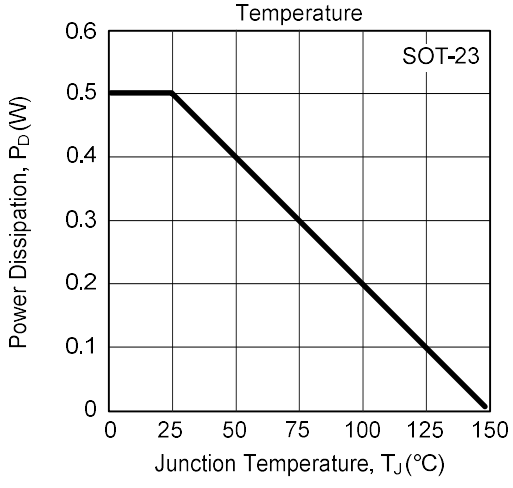
Drain Current vs. Gate-Source Voltage



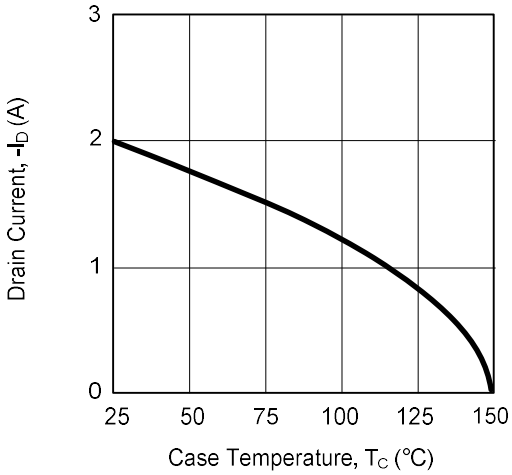
Drain-Source On-Resistance vs. Drain Current



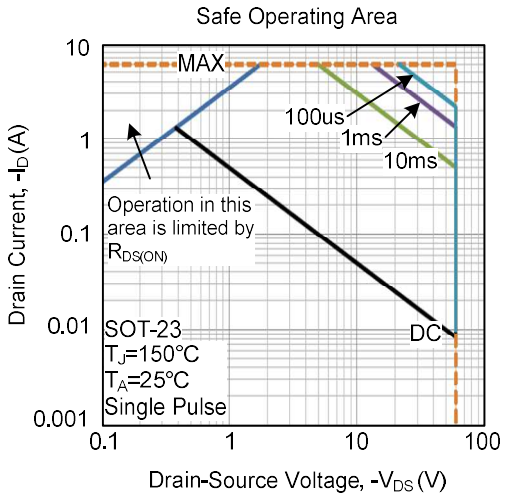
Power Dissipation vs. Junction Temperature



Drain Current vs. Case Temperature



■ TYPICAL CHARACTERISTICS (Cont.)



Note: 250°C/W when mounted on a 0.02 in2 pad of 2 oz. copper.