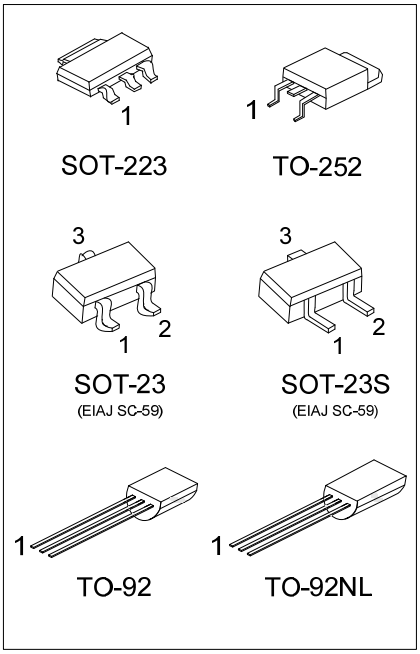
2.0A, 100V N-CHANNEL POWER MOSFET



■ DESCRIPTION

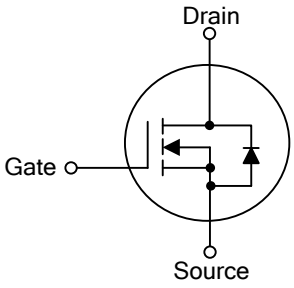
The UTC **UT2N10** is N-Channel enhancement mode silicon gate power FET.it uses a special gate oxide designed to provide full rated conductance at gate biases through 3V ~ 5V and facilitate true on-off power control directly from logic circuit supply voltages.

The UTC **UT2N10** is universally applied in logic level (5V) driving sources, such as automotive switching, solenoid drivers and programmable controllers.

■ FEATURES

* $R_{DS(ON)}$ ≤ 0.32 Ω @ V_{GS} =10V, I_D =2.0A
  $R_{DS(ON)}$ ≤ 0.38 Ω @ V_{GS} =4.5V, I_D =2.0A
* Design Optimized for 5V Gate Drives
* Can be Driven Directly from QMOS, NMOS, TTL Circuits
* SOA is Power Dissipation Limited
* Nanosecond Switching Speeds
* Linear Transfer Characteristics

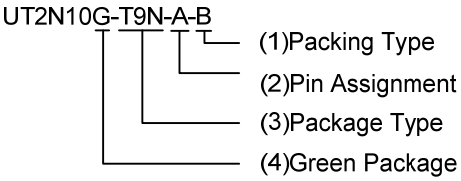
■ SYMBOL



■ ORDERING INFORMATION

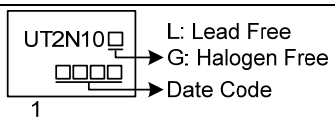
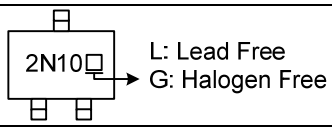
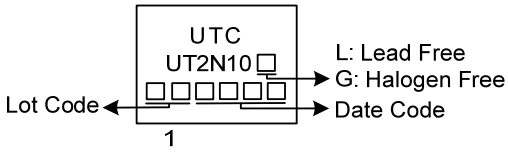
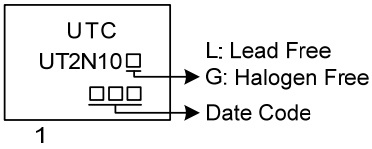
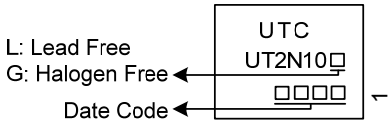
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UT2N10L-AA3-R	UT2N10G-AA3-R	SOT-223	G	D	S	Tape Reel
UT2N10L-AE3-R	UT2N10G-AE3-R	SOT-23	G	S	D	Tape Reel
UT2N10L-AE3S-R	UT2N10G-AE3S-R	SOT-23S	G	S	D	Tape Reel
UT2N10L-TN3-R	UT2N10G-TN3-R	TO-252	G	D	S	Tape Reel
UT2N10L-T92-B	UT2N10G-T92-B	TO-92	G	D	S	Tape Box
UT2N10L-T92-K	UT2N10G-T92-K	TO-92	G	D	S	Bulk
UT2N10L-T9N-B	UT2N10G-T9N-B	TO-92NL	G	D	S	Tape Box
UT2N10L-T9N-K	UT2N10G-T9N-K	TO-92NL	G	D	S	Bulk
UT2N10L-T9N-A-B	UT2N10G-T9N-A-B	TO-92NL	S	D	G	Tape Box
UT2N10L-T9N-A-K	UT2N10G-T9N-A-K	TO-92NL	S	D	G	Bulk

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



(1) R: Tape Reel, B: Tape Box, K: Bulk
(2) refer to Pin Assignment (for TO-92NL)
(3) AA3: SOT-223, AE3: SOT-23, AE3S: SOT-23S, TN3: TO-252, T92: TO-92, T9N: TO-92NL
(4) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

PACKAGE	MARKING
SOT-223	
SOT-23 SOT-23S	
TO-252	
TO-92	
TO-92NL	

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage (Note 1)		V_{DSS}	100	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous	I_D	2	A
	Pulsed (Note 3)	I_{DM}	4	A
Power Dissipation	SOT-223	P_D	0.7	W
	SOT-23/SOT-23S		0.5	W
	TO-252		2	W
	TO-92/TO-92NL		0.6	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°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	SOT-223	θ_{JA}	178	°C/W
	SOT-23/SOT-23S		250	°C/W
	TO-252		62.5	°C/W
	TO-92/TO-92NL		208	°C/W

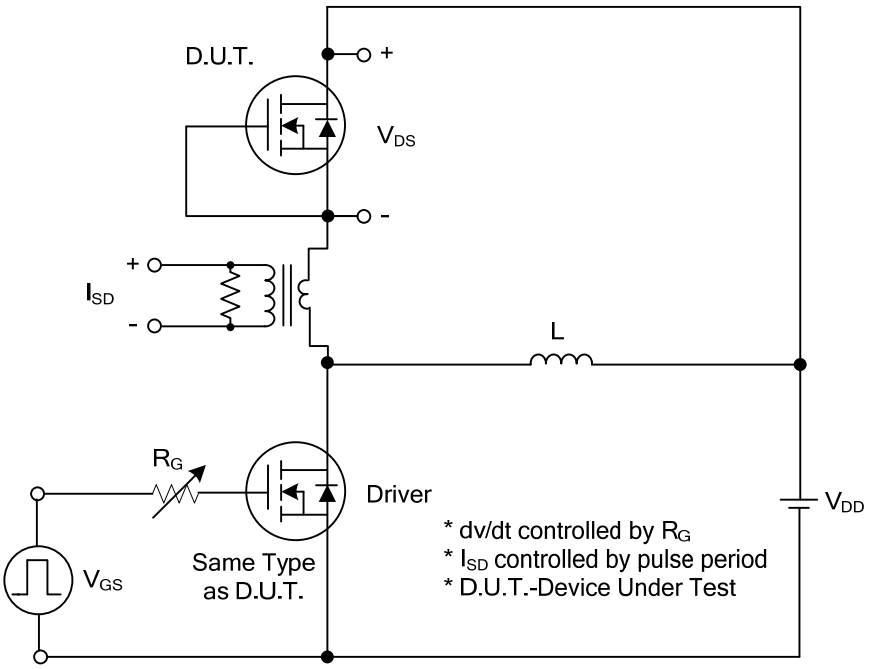
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

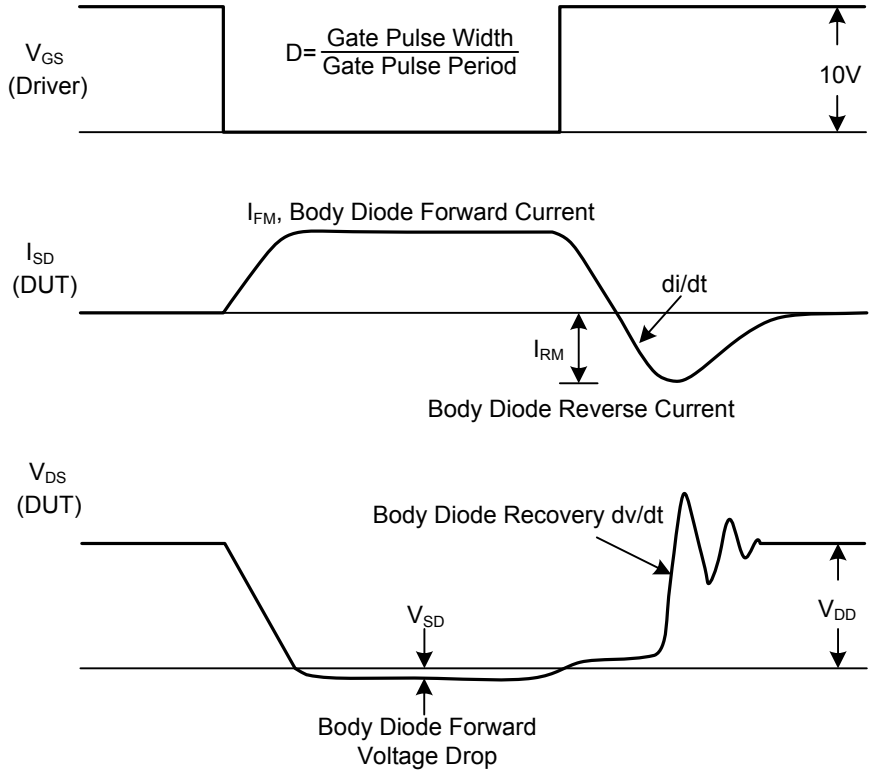
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D =250μA	100			V
Drain-Source Leakage Current	I_{DSS}	V_{DS} =60V, V_{GS} =0V			1	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS} =±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS} =V_{GS}, I_D =250μA	1.0		3.0	V
Drain to Source On-state Resistance	$R_{DS(ON)}$	V_{GS} =10V, I_D =2.0A			0.32	Ω
		V_{GS} =4.5V, I_D =2.0A			0.38	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		280		pF
Output Capacitance	C_{OSS}			155		pF
Reverse Transfer Capacitance	C_{RSS}			15		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note)	Q_G	V_{DS}=80V, V_{GS}=10V, I_D=2.0A I_G=1mA (Note 1, 2)		13		nC
Gate Source Charge	Q_{GS}			3.5		nC
Gate Drain Charge	Q_{GD}			2		nC
Turn-ON Delay Time (Note)	$t_{D(ON)}$	V_{DS}=50V, V_{GS}=10V, I_D=2.0A, R_G=3Ω (Note 1, 2)		3.2		ns
Turn-ON Rise Time	t_R			16		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			9		ns
Turn-OFF Fall-Time	t_F			19.8		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				2	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				4	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	I_S =2.0A, V_{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	I_S=2.0A, V_{GS}=0V, dI_F/dt =100A/μs		28		ns
Body Diode Reverse Recovery Charge	Q_{rr}			23		nC

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

■ TEST CIRCUITS AND WAVEFORMS

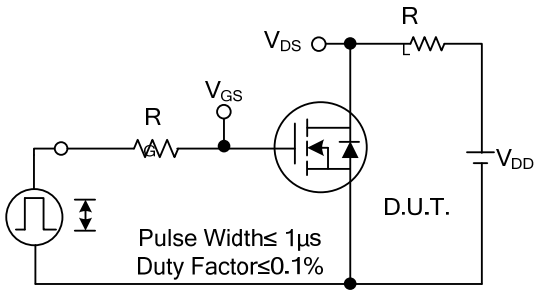


Peak Diode Recovery dv/dt Test Circuit

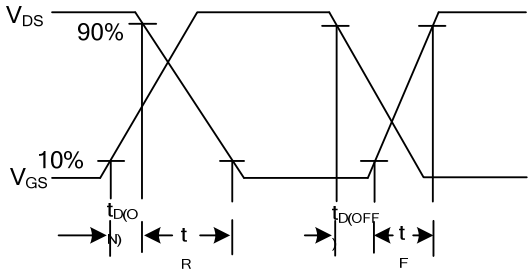


Peak Diode Recovery dv/dt Waveforms

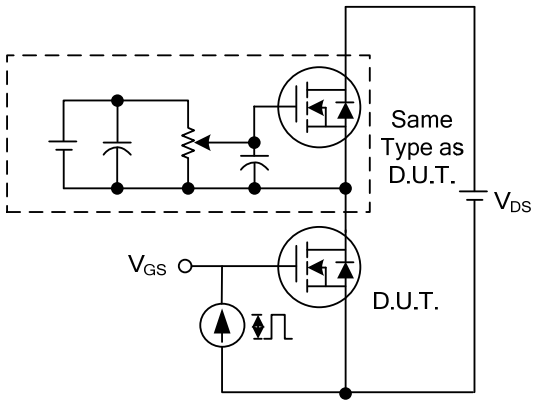
■ TEST CIRCUITS AND WAVEFORMS



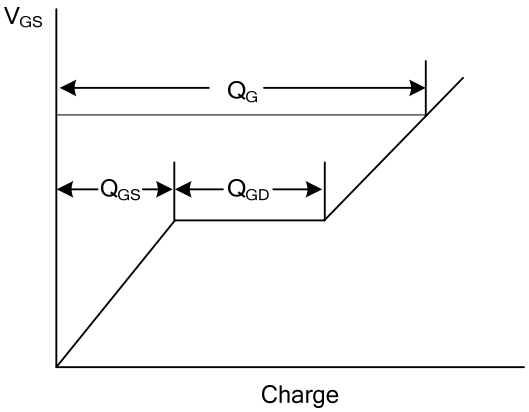
Switching Test Circuit



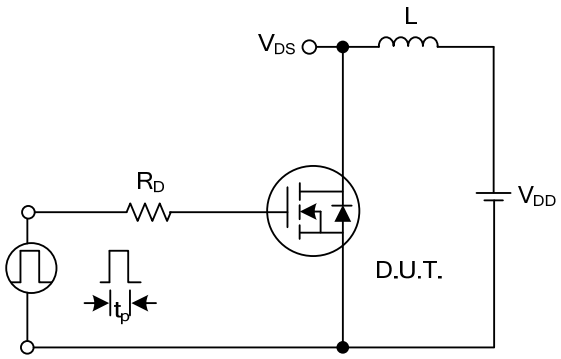
Switching Waveforms



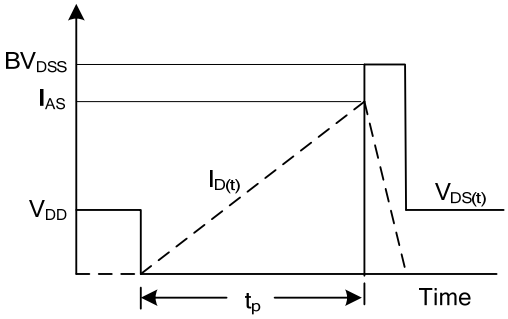
Gate Charge Test Circuit



Gate Charge Waveform

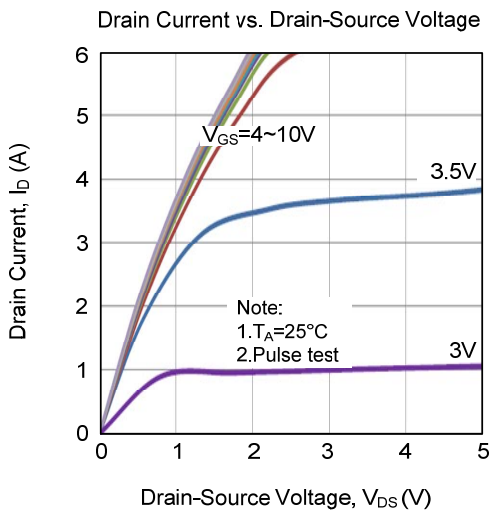


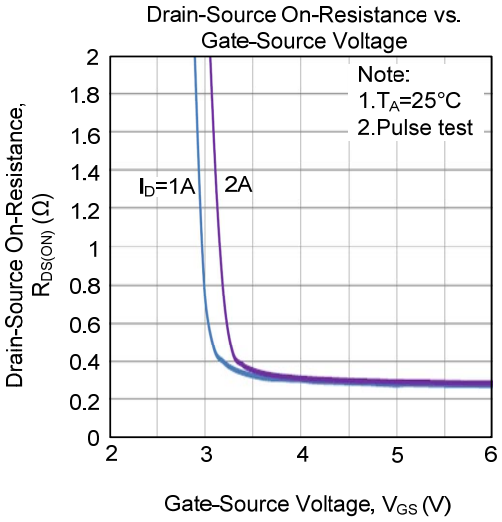
Unclamped Inductive Switching Test Circuit

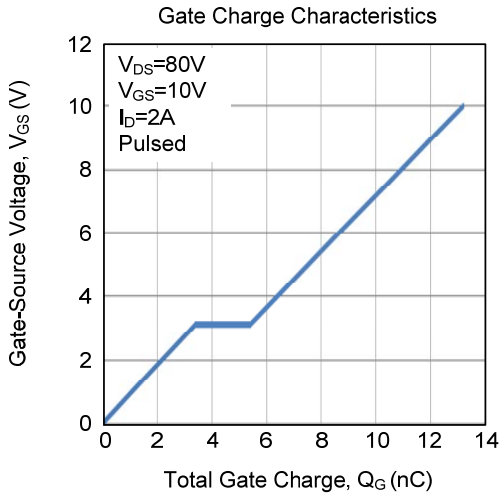


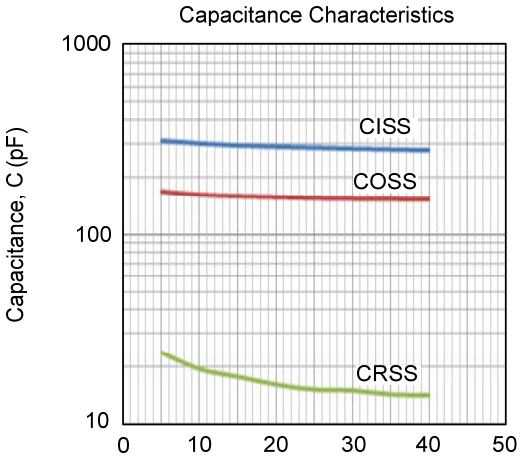
Unclamped Inductive Switching Waveforms

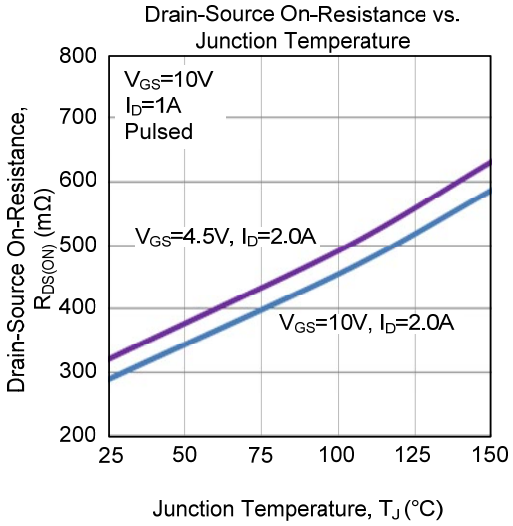
■ TYPICAL CHARACTERISTICS

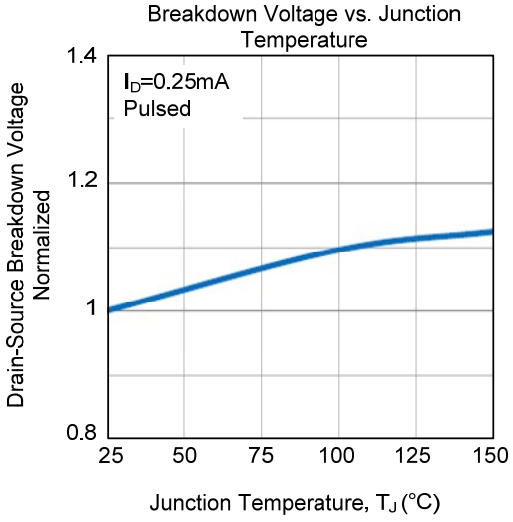






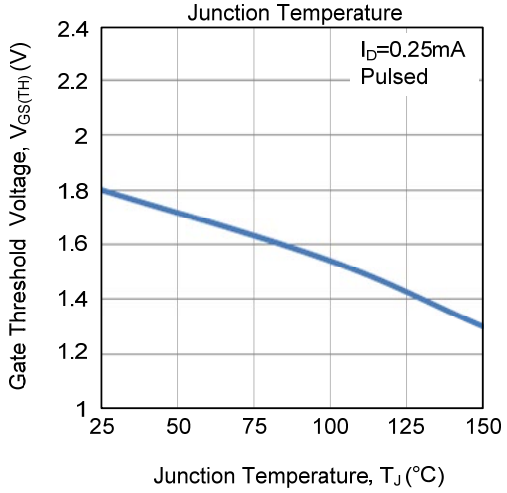




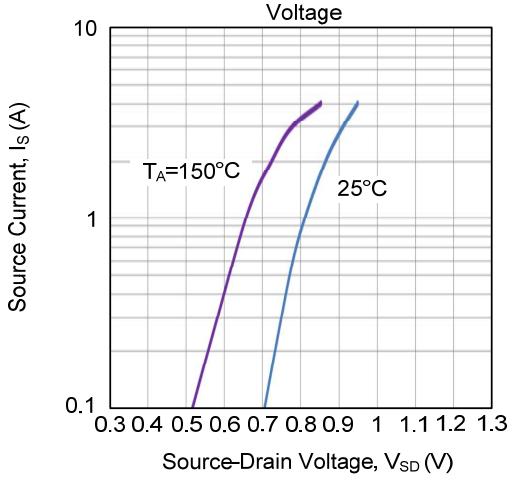


■ TYPICAL CHARACTERISTICS (Cont.)

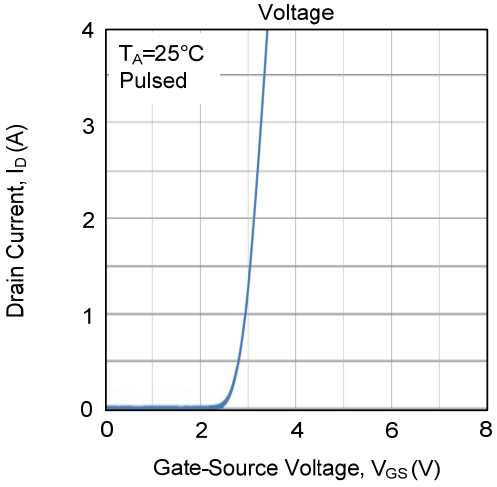
Gate Threshold Voltage vs. Junction Temperature



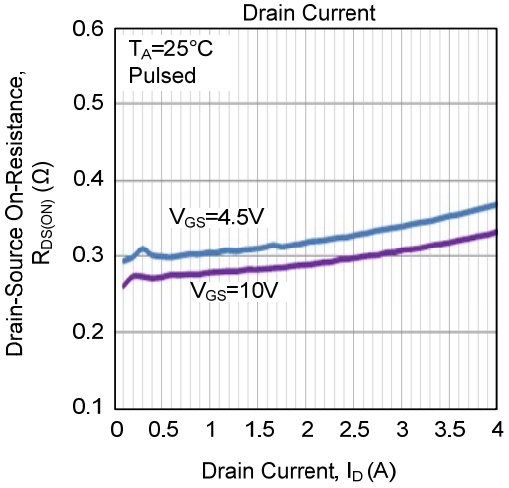
Source Current vs. Source-Drain Voltage



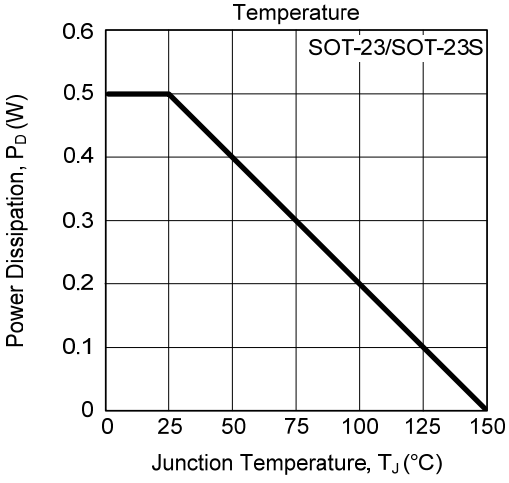
Drain Current vs. Gate-Source Voltage



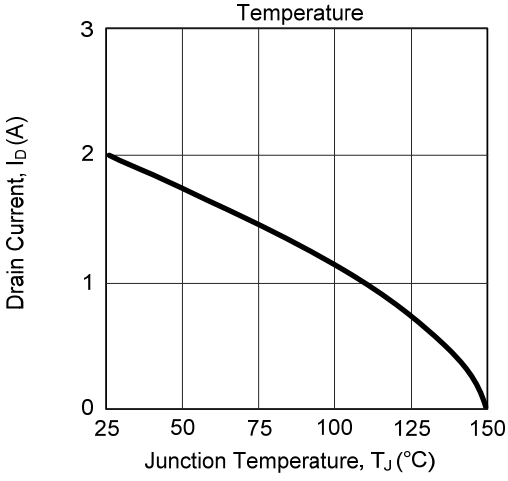
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)