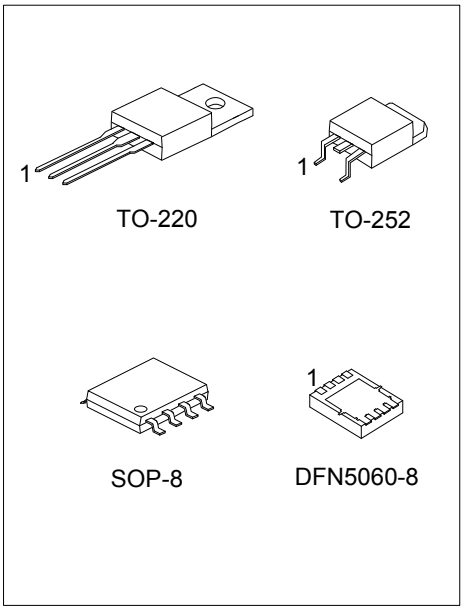
UTM6016

Power MOSFET

12A, 60V N-CHANNEL FAST SWITCHING MOSFET



■ DESCRIPTION

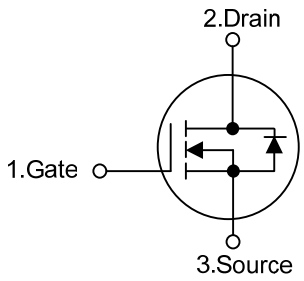
The UTC **UTM6016** is an N-Channel MOSFET, it uses UTC's advanced technology to provide customers with a minimum on-state resistance, high switching speed and low gate charge.

The UTC **UTM6016** is suitable for application in networking DC-DC power system and LCD/LED back light, etc.

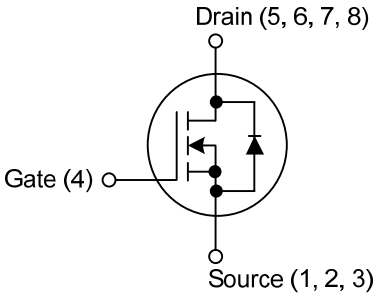
■ FEATURES

* $R_{DS(ON)} \leq 12m\Omega$ @ V_{GS}=10V, I_D=8.0A
  $R_{DS(ON)} \leq 15m\Omega$ @ V_{GS}=4.5V, I_D=6.0A
* Low gate charge
* Excellent CdV/dt effect decline
* High switching speed

■ SYMBOL



TO-220/TO-252

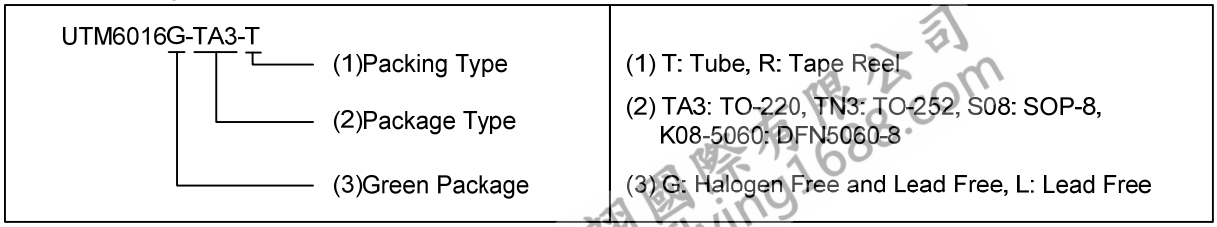


SOP-8/DFN5060-8

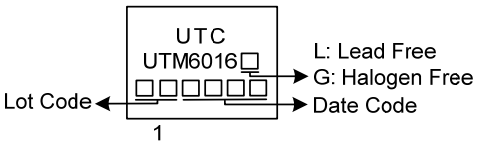
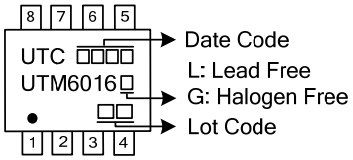
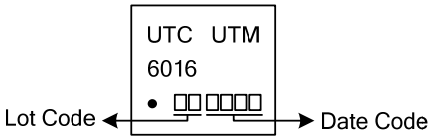
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTM6016L-TA3-T	UTM6016G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UTM6016L-TN3-R	UTM6016G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UTM6016L-S08-R	UTM6016G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
UTM6016L-K08-5060-R	UTM6016G-K08-5060-R	DFN5060-8	S	S	S	G	D	D	D	D	Tape Reel

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



■ MARKING

Package	Marking
TO-220 TO-252	
SOP-8	
DFN5060-8	

■ 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	I_D	12	A
	Pulsed (Note 2)	I_{DM}	32	A
Avalanche Current (Note 2)		I_{AR}	23	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	26	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.6	V/ns
Power Dissipation (Note 4)	TO-220	P_D	140	W
	TO-252		40	W
	SOP-8		5.2	W
	DFN5060-8		10.4	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}=23A, V_{DD}=25V, R_G=25 Ω, Starting T_J = 25°C
4. I_{SD}≤12A, di/dt≤200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
5. The power dissipation is limited by 150°C junction temperature.

■ THERMAL CHARACTERISTICS (Note 1)

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	$θ_{JA}$	62.5	°C/W
	TO-252		110	
	SOP-8/DFN5060-8		50	
Junction to Case	TO-220	$θ_{JC}$	0.89	°C/W
	TO-252		3.13	
	SOP-8		24	
	DFN5060-8		12	

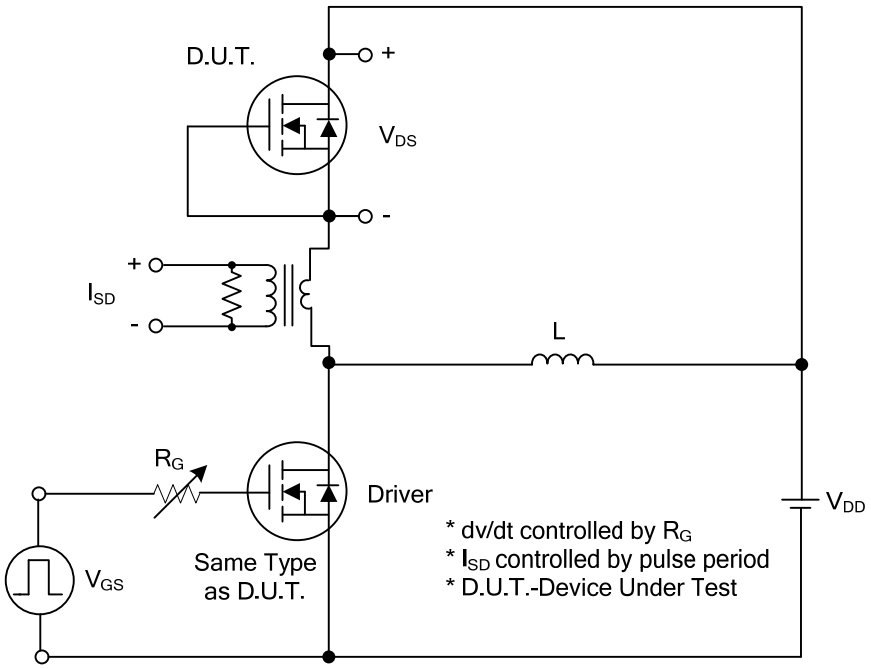
Notes: 1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.

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

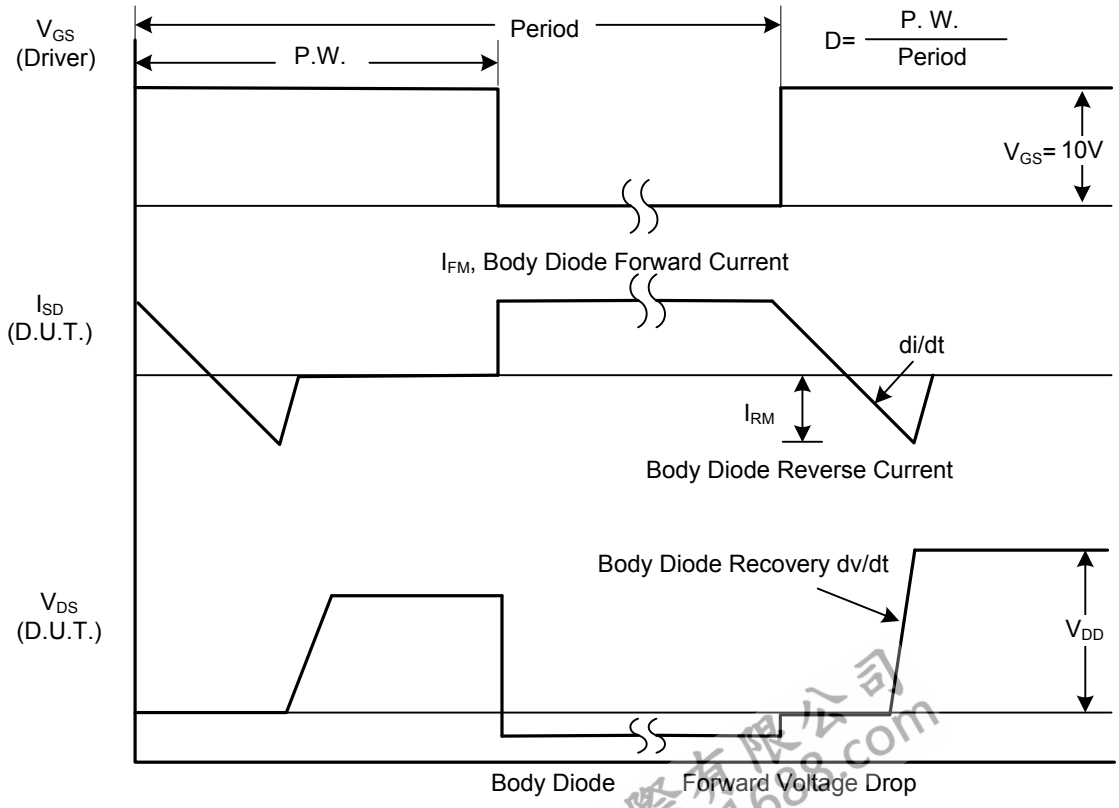
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	60			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=48V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	1.2		2.5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=8.0A			12	mΩ
			V_{GS}=4.5V, I_D=6.0A			15	mΩ
Forward Transconductance		g_{FS}	V_{DS}=5V, I_D=12A		45		S
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		3080		pF
Output Capacitance		C_{OSS}			235		pF
Reverse Transfer Capacitance		C_{RSS}			180		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=30V, V_{GS}=10V, I_D=12A I_G=1mA		74		nC
Gate to Source Charge		Q_{GS}			9		nC
Gate to Drain Charge		Q_{GD}			12		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=30V, V_{GS}=0V, I_D=12A, R_G=25Ω (Note 1, 2)		11		ns
Rise Time		t_R			16		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			48		ns
Fall-Time		t_F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				12	A
Maximum Body-Diode Pulsed Current		I_{SM}				32	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=12A, V_{GS}=0V			1.2	V
Body Diode Reverse Recovery Time (Note 1)		t_{rr}	I_S=12A, V_{GS}=0V, dI_F/dt=100A/μs		210		nS
Body Diode Reverse Recovery Charge		Q_{rr}			430		nC

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

■ TEST CIRCUITS AND WAVEFORMS

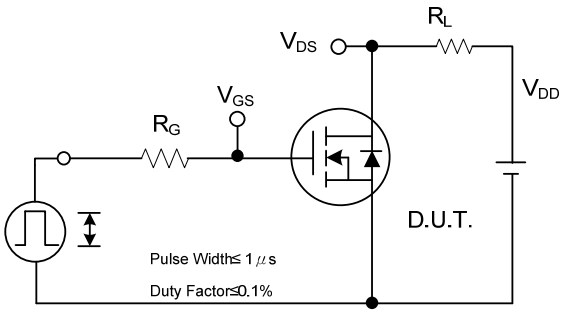


Peak Diode Recovery dv/dt Test Circuit

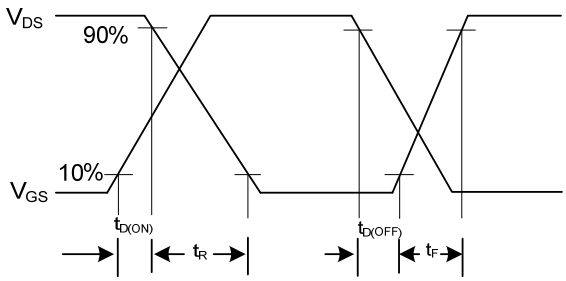


Peak Diode Recovery dv/dt Waveforms

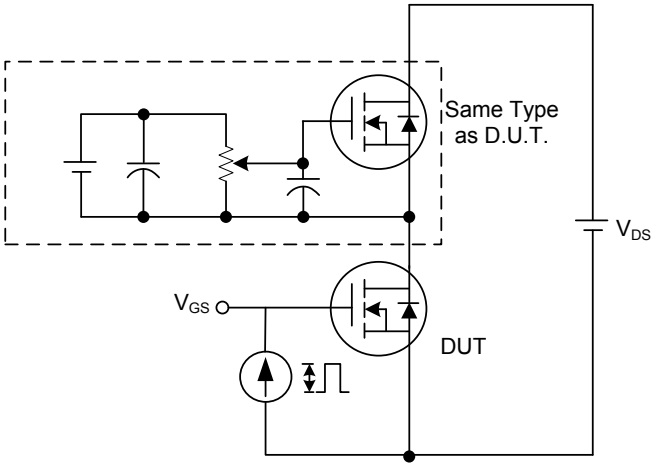
■ TEST CIRCUITS AND WAVEFORMS



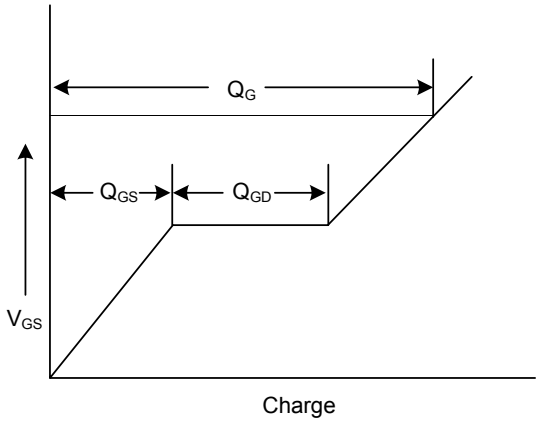
Switching Test Circuit



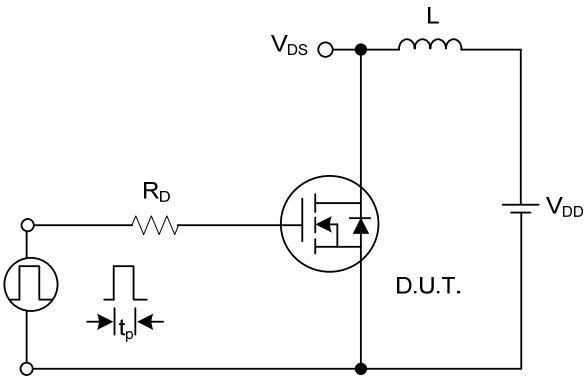
Switching Waveforms



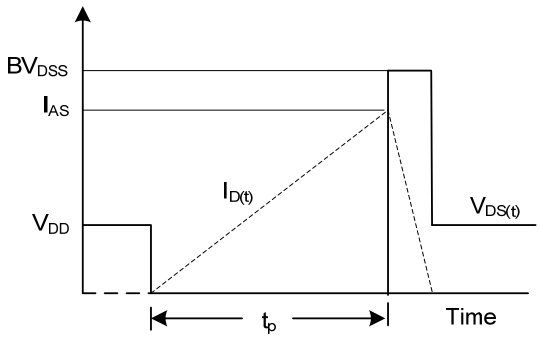
Gate Charge Test Circuit



Gate Charge Waveform



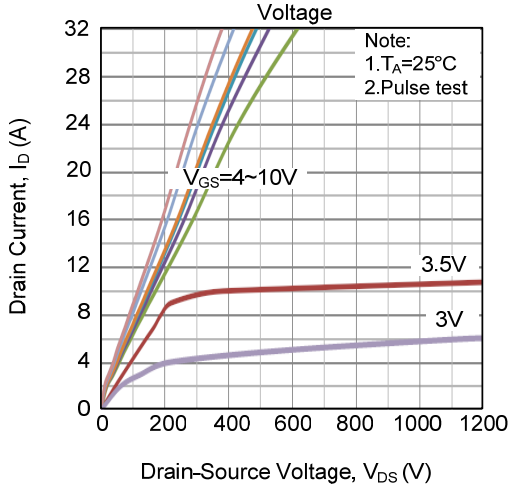
Unclamped Inductive Switching Test Circuit



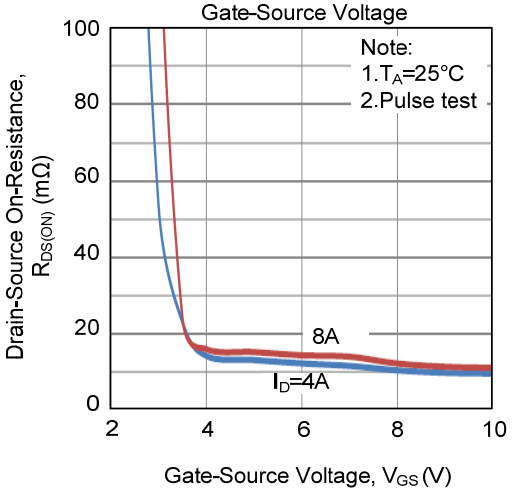
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

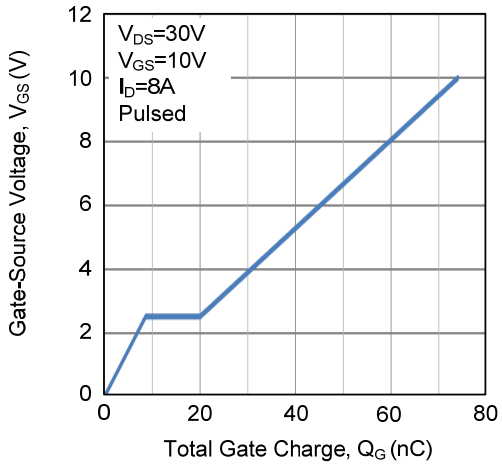
Drain Current vs. Drain-Source Voltage



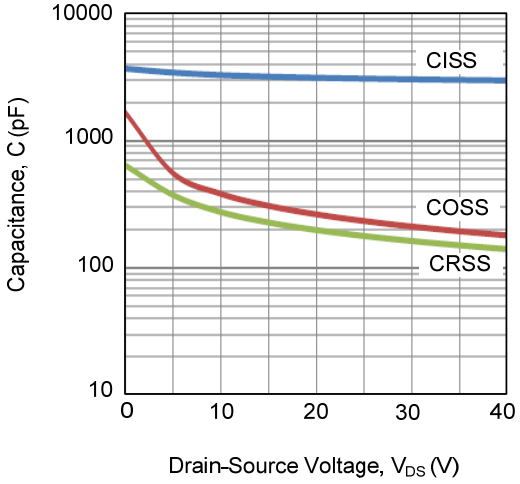
Drain-Source On-Resistance vs. Gate-Source Voltage



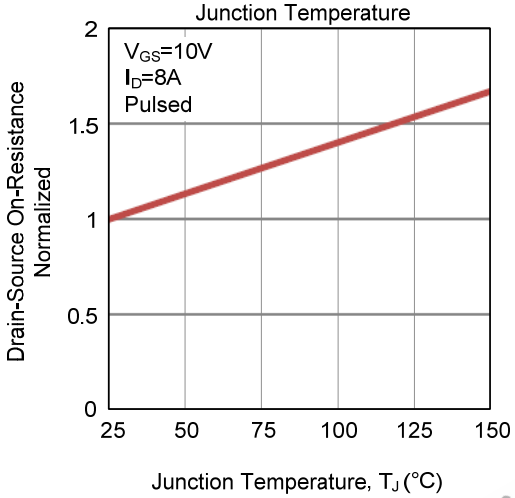
Gate Charge Characteristics



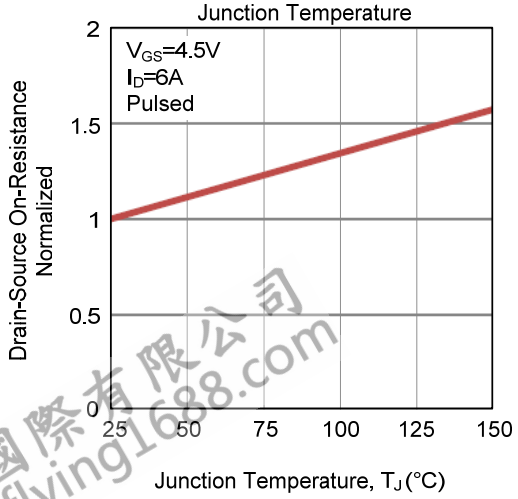
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

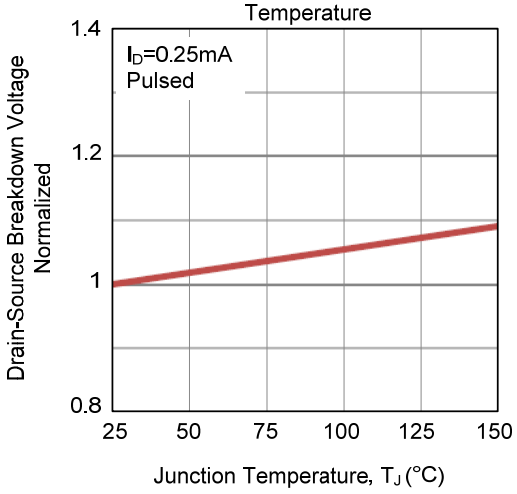


Drain-Source On-Resistance vs. Junction Temperature

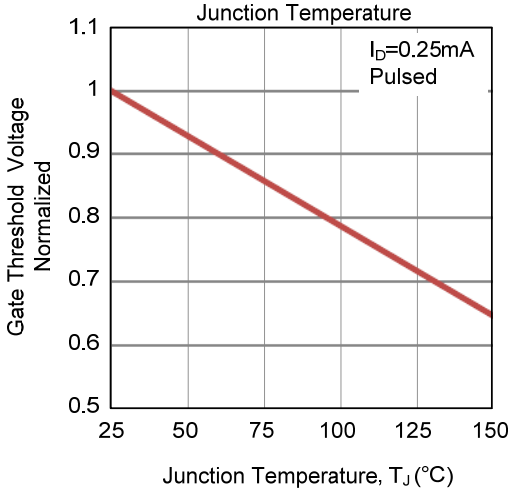


■ TYPICAL CHARACTERISTICS (Cont.)

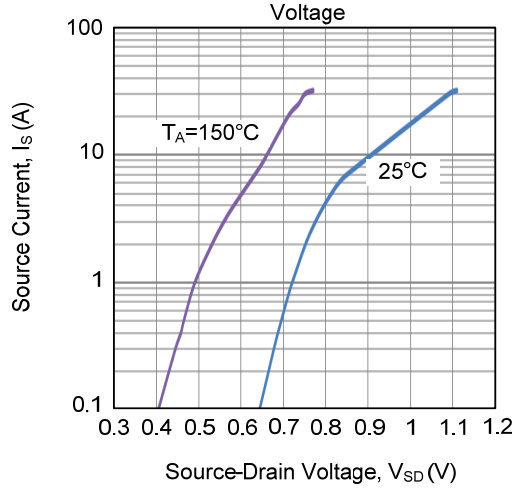
Breakdown Voltage vs. Junction Temperature



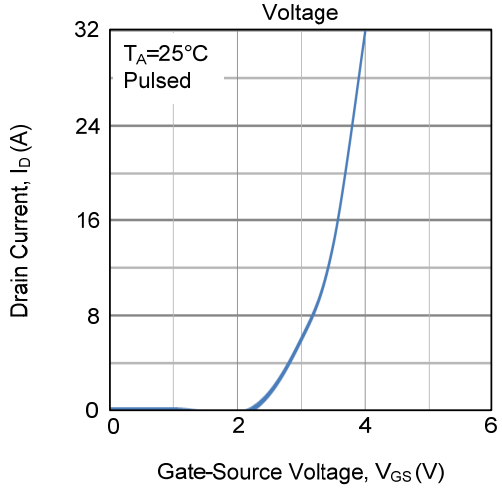
Gate Threshold Voltage vs. Junction Temperature



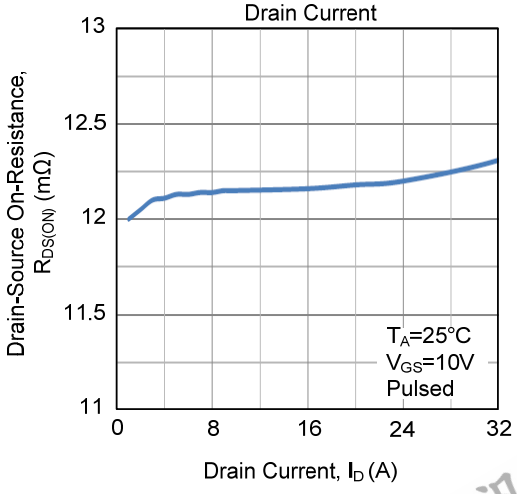
Source Current vs. Source-Drain Voltage



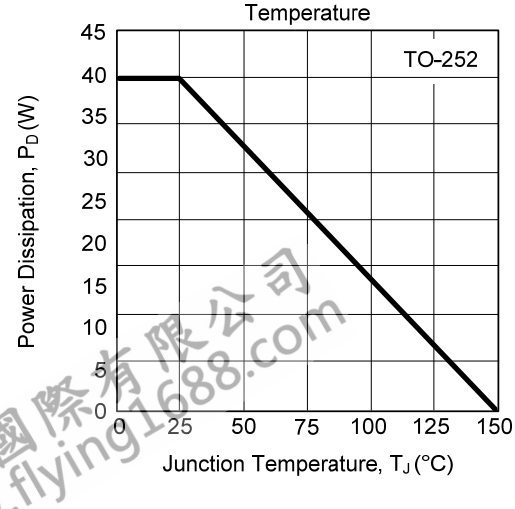
Drain Current vs. Gate-Source Voltage



Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)