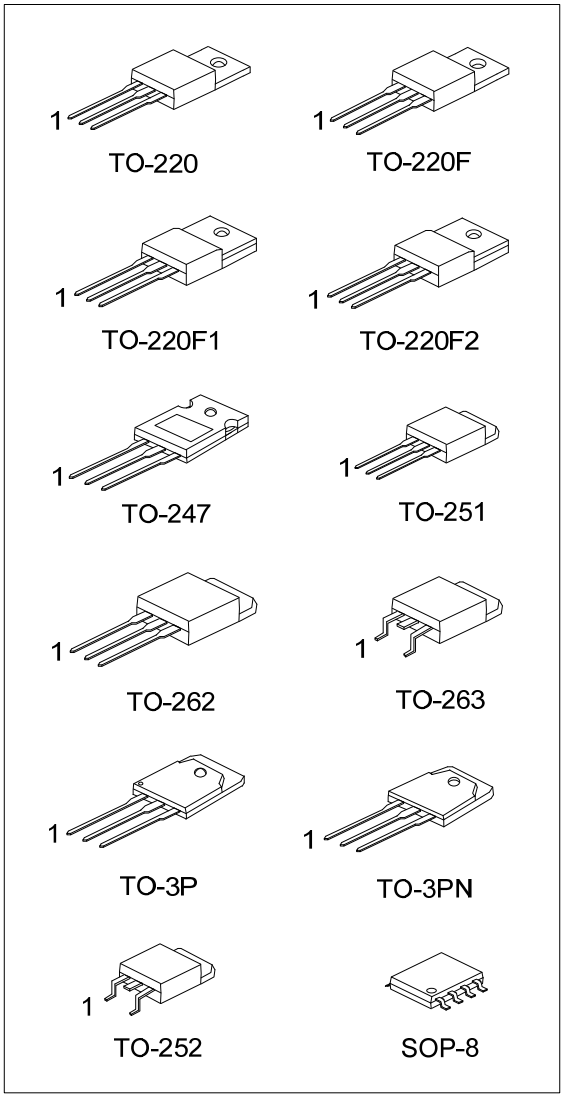
UF640-HC

Power MOSFET

18A, 200V N-CHANNEL POWER MOSFET



■ DESCRIPTION

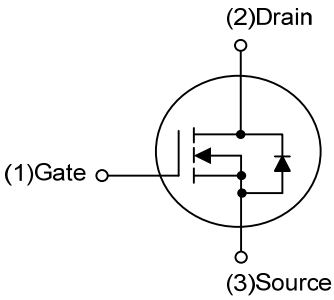
The UTC **UF640-HC** is a N-channel enhancement MOSFET using UTC's advanced technology to provide the customers with perfect $R_{DS(ON)}$, high switching speed, high current capacity and low gate charge.

The UTC **UF640-HC** is universally applied in low voltage such as automotive, high efficiency switching for AC/DC converters and DC motor control, etc.

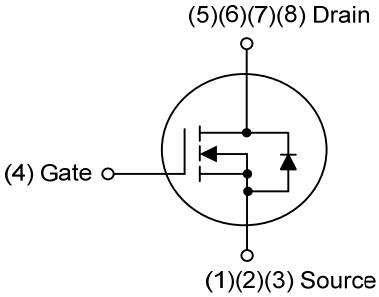
■ FEATURES

* $R_{DS(ON)} \leq 0.18\ \Omega$ @ V_{GS}=10V, I_D=9.0A
* High Switching Speed

■ SYMBOL



TO-220/TO-220F/TO-220F1
TO-220F2/TO-247/TO-251/TO-252/
TO-262/TO-263/TO-3P/TO-3PN

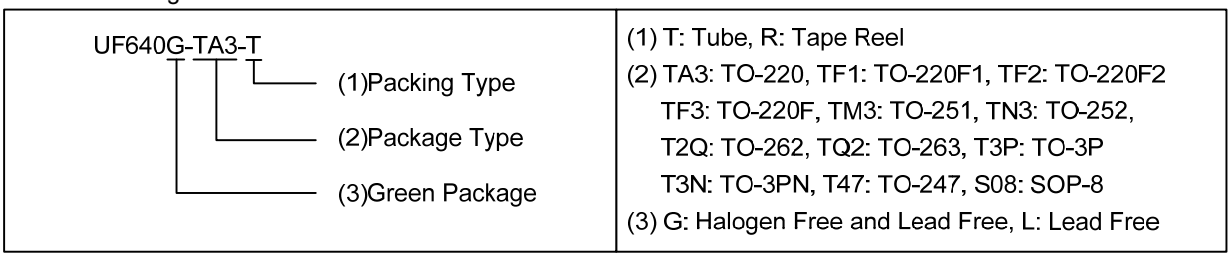


PDFN5×6

■ ORDERING INFORMATION

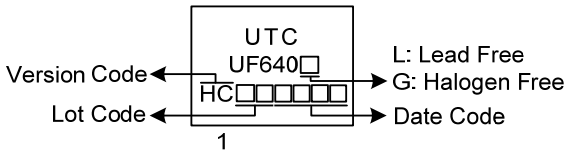
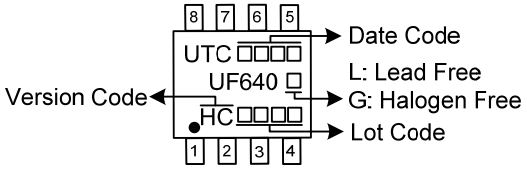
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UF640L-TA3-T	UF640G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UF640L-TF1-T	UF640G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
UF640L-TF2-T	UF640G-TF2-T	TO-220F2	G	D	S	-	-	-	-	-	Tube
UF640L-TF3-T	UF640G-TF3-T	TO-220F	G	D	S	-	-	-	-	-	Tube
UF640L-TM3-T	UF640G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
UF640L-TN3-R	UF640G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UF640L-T2Q-T	UF640G-T2Q-T	TO-262	G	D	S	-	-	-	-	-	Tube
UF640L-TQ2-T	UF640G-TQ2-T	TO-263	G	D	S	-	-	-	-	-	Tube
UF640L-TQ2-R	UF640G-TQ2-R	TO-263	G	D	S	-	-	-	-	-	Tape Reel
UF640L-T3P-T	UF640G-T3P-T	TO-3P	G	D	S	-	-	-	-	-	Tube
UF640L-T3N-T	UF640G-T3N-T	TO-3PN	G	D	S	-	-	-	-	-	Tube
UF640L-T47-T	UF640G-T47-T	TO-247	G	D	S	-	-	-	-	-	Tube
UF640L-S08-R	UF640G-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) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2
TF3: TO-220F, TM3: TO-251, TN3: TO-252,
T2Q: TO-262, TQ2: TO-263, T3P: TO-3P
T3N: TO-3PN, T47: TO-247, S08: SOP-8
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-220/TO-220F/TO-220F1/TO-220F2/TO-247 TO-251/TO-252/TO-262/TO-263/TO-3P/TO-3PN	SOP-8
	

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	200	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current	Continuous	I_D	18	A
	Pulsed	I_{DM}	72	A
Single Pulsed Avalanche Current		I_{AS}	5.7	A
Single Pulsed Avalanche Energy		E_{AS}	487	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.3	V/ns
Power Dissipation	TO-220/TO-262 TO-263	P_D	98	W
	TO-220F/TO-220F1 TO-220F2		39	W
	TO-251/TO-252		54	W
	TO-247		120	W
	TO-3P/TO-3PN		140	W
	SOP-8		6	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 = 30mH, I_{AS} = 5.7A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤18A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2 TO-262/TO-263	θ_{JA}	62.5	°C/W
	TO-251/TO-252		110	°C/W
	TO-247		50	°C/W
	TO-3P/TO-3PN		40	°C/W
	SOP-8		90	°C/W
Junction to Case	TO-220/TO-262 TO-263	θ_{JC}	1.27	°C/W
	TO-220F/TO-220F1 TO-220F2		3.2	°C/W
	TO-251/TO-252		2.31 (Note)	°C/W
	TO-247		1.04	°C/W
	TO-3P/TO-3PN		0.89	°C/W
	SOP-8		20.8 (Note)	°C/W

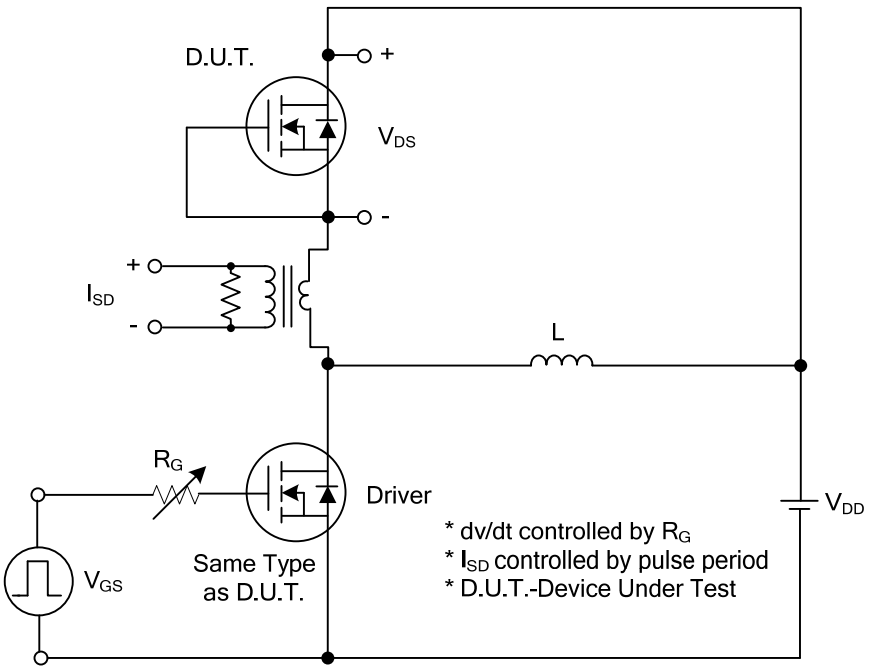
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

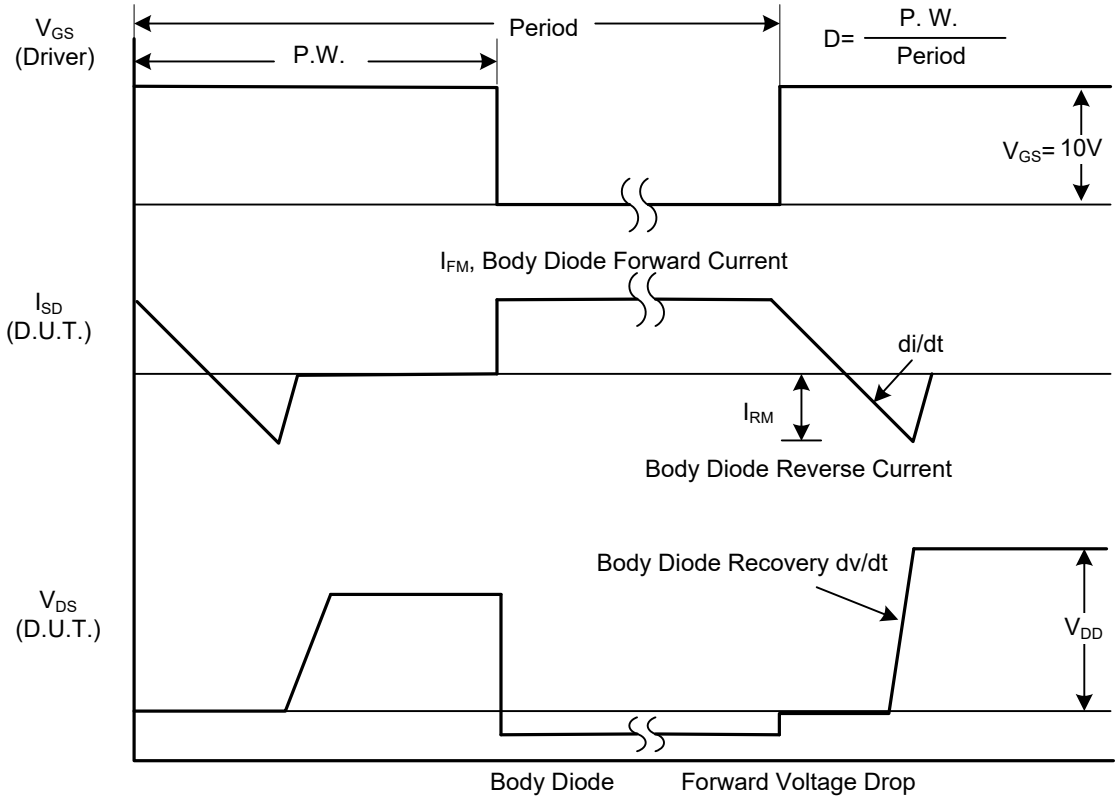
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	200			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=200V, V_{GS}=0V			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+30V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-30V, 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=9.0A			0.18	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		840		pF
Output Capacitance		C_{OSS}			150		pF
Reverse Transfer Capacitance		C_{RSS}			10		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=160V, V_{GS}=10V, I_D=18A I_G=1mA (Note 1, 2)		20		nC
Gate to Source Charge		Q_{GS}			5		nC
Gate to Drain Charge		Q_{GD}			4		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=100V, I_D=18A, R_G=25Ω (Note 1, 2)		10		ns
Rise Time		t_R			18		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			52		ns
Fall-Time		t_F			21		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				18	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				72	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=18A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time		t_{rr}	I_S=18A, V_{GS}=0V, dI_F/dt=100A/μs (Note 1)		140		ns
Reverse Recovery Charge		Q_{rr}			0.7		μC

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

■ TEST CIRCUITS AND WAVEFORMS

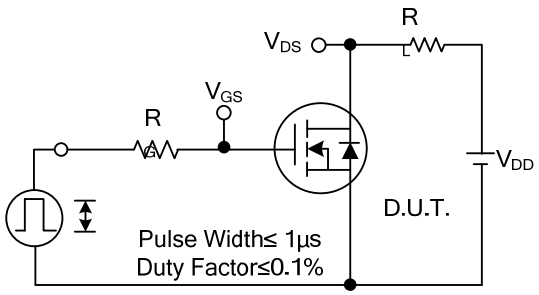


Peak Diode Recovery dv/dt Test Circuit

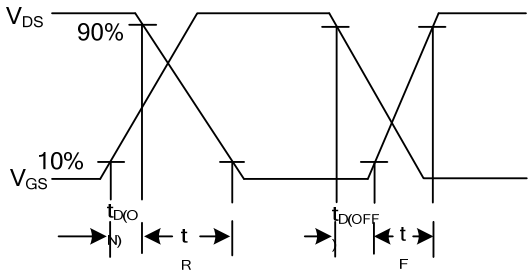


Peak Diode Recovery dv/dt Waveforms

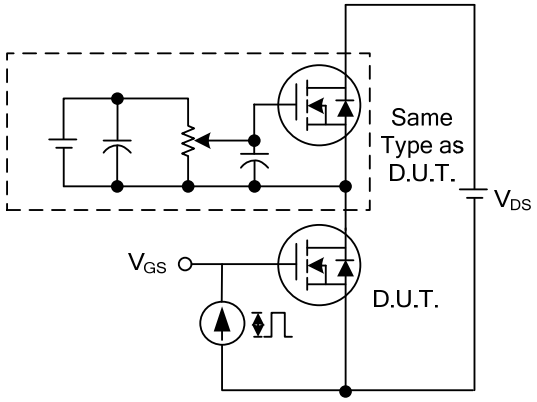
■ TEST CIRCUITS AND WAVEFORMS



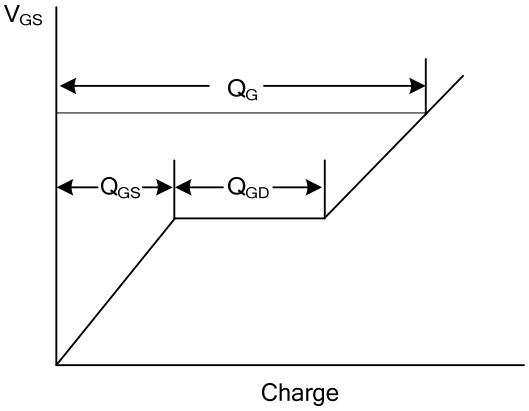
Switching Test Circuit



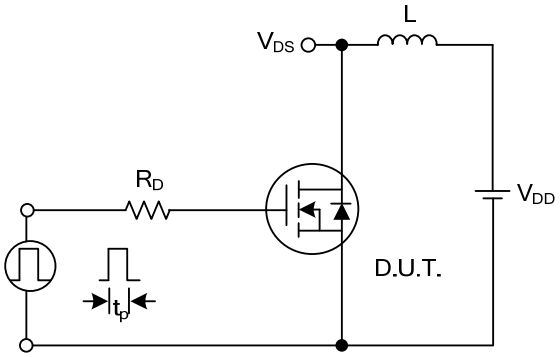
Switching Waveforms



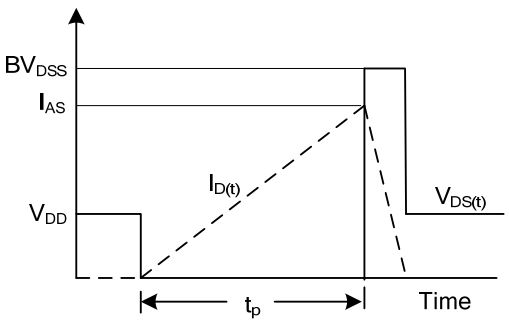
Gate Charge Test Circuit



Gate Charge Waveform



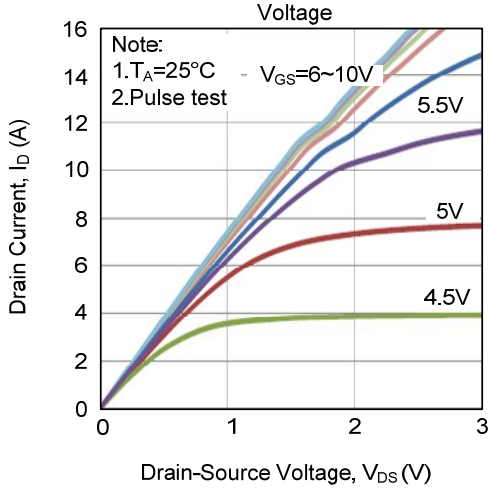
Unclamped Inductive Switching Test Circuit



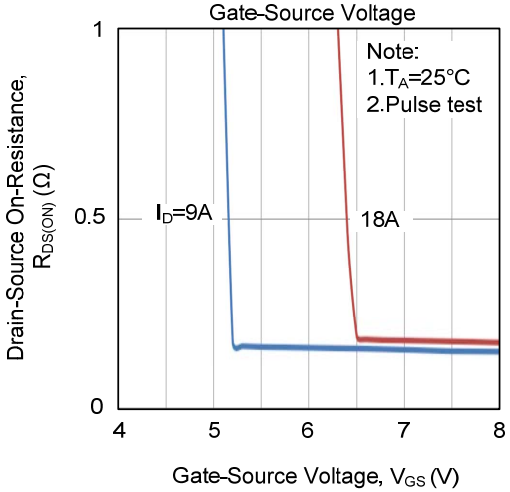
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

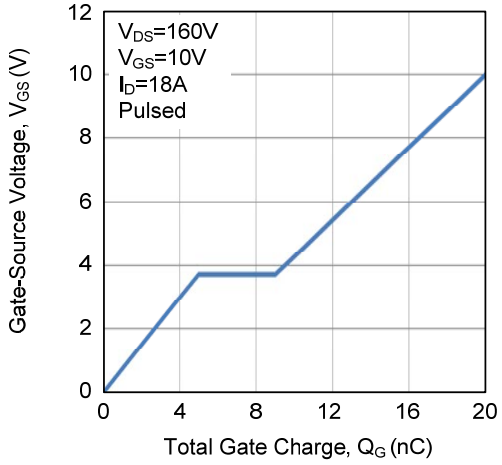
Drain Current vs. Drain-Source Voltage



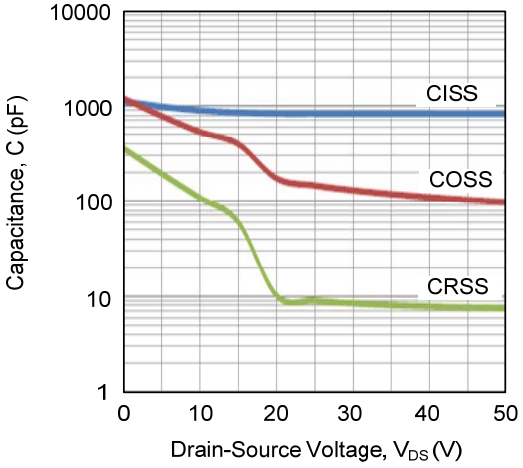
Drain-Source On-Resistance vs. Gate-Source Voltage



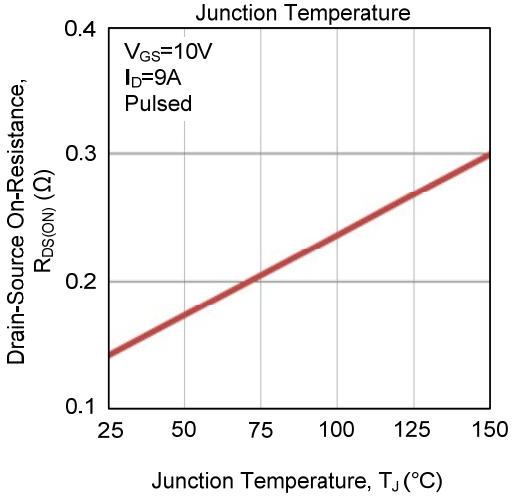
Gate Charge Characteristics



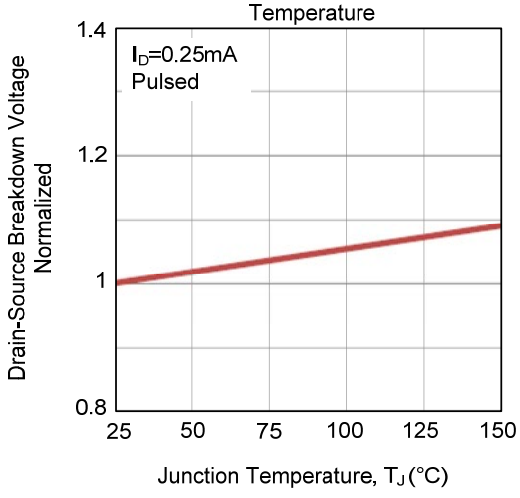
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

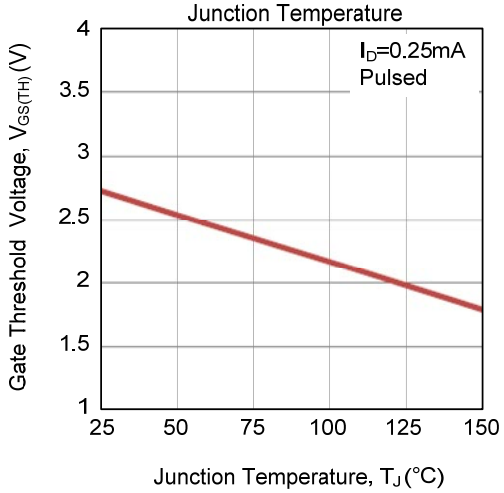


Breakdown Voltage vs. Junction Temperature

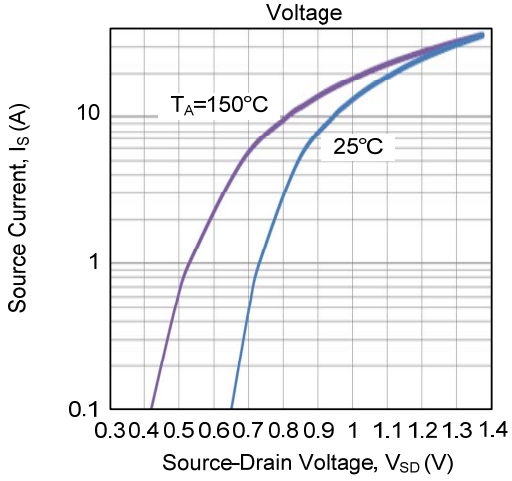


■ TYPICAL CHARACTERISTICS (Cont.)

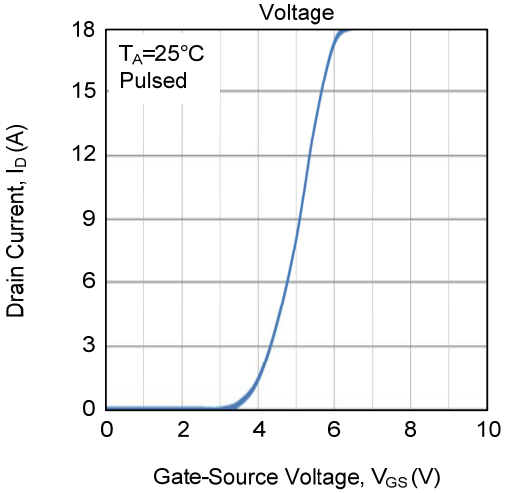
Gate Threshold Voltage vs. Junction Temperature



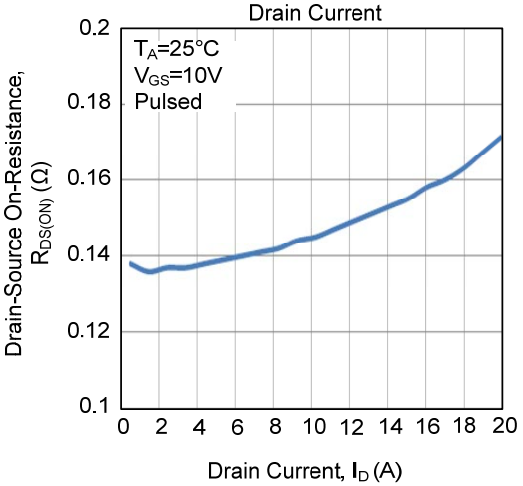
Source Current vs. Source-Drain Voltage



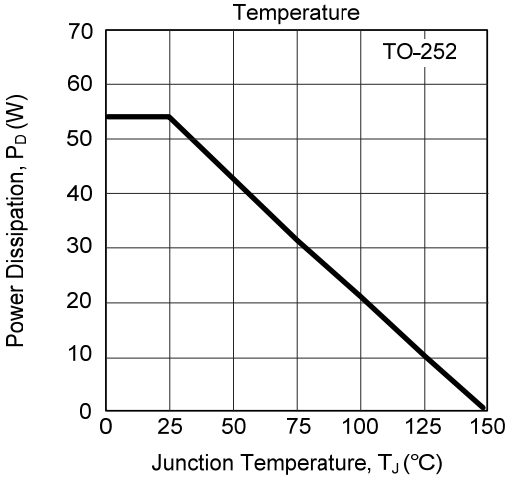
Drain Current vs. Gate-Source Voltage



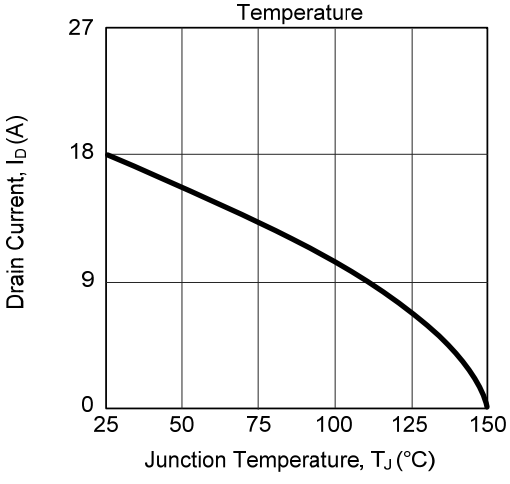
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)