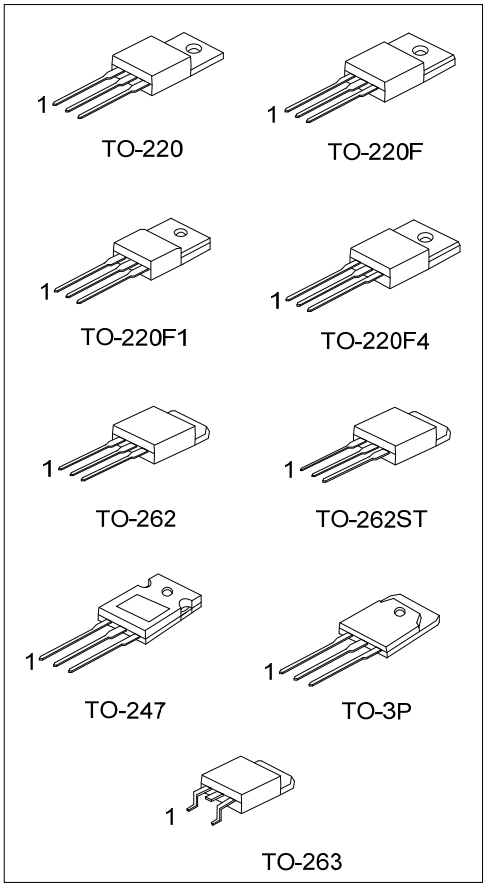
6.2A, 900V N-CHANNEL POWER MOSFET



■ DESCRIPTION

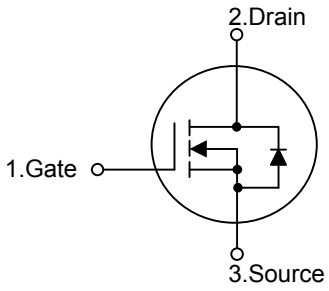
The UTC **6N90** is a N-channel enhancement mode power MOSFET using UTC's advanced technology to provide costumers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **6N90** is generally applied in high efficiency switch mode power supplies.

■ FEATURES

* $R_{DS(ON)} \leq 2.3\Omega$ @ V_{GS}=10V, I_D=3.1A
* Fast switching
* 100% avalanche tested
* Improved dv/dt capability

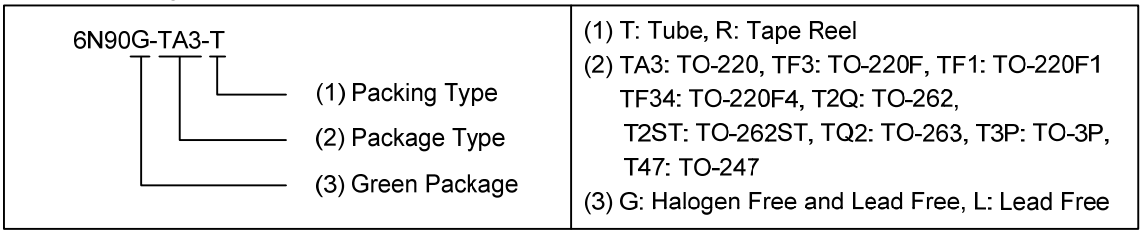
■ SYMBOL



■ ORDERING INFORMATION

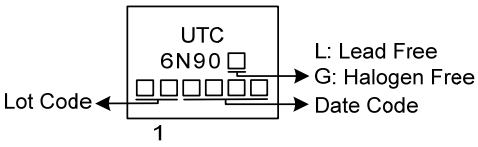
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N90L-TA3-T	6N90G-TA3-T	TO-220	G	D	S	Tube
6N90L-TF3-T	6N90G-TF3-T	TO-220F	G	D	S	Tube
6N90L-TF1-T	6N90G-TF1-T	TO-220F1	G	D	S	Tube
6N90L-TF34-T	6N90G-TF34-T	TO-220F4	G	D	S	Tube
6N90L-T2Q-T	6N90G-T2Q-T	TO-262	G	D	S	Tube
6N90L-T2ST-T	6N90G-T2ST-T	TO-262ST	G	D	S	Tube
6N90L-TQ2-T	6N90G-TQ2-T	TO-263	G	D	S	Tube
6N90L-TQ2-R	6N90G-TQ2-R	TO-263	G	D	S	Tape Reel
6N90L-T3P-T	6N90G-T3P-T	TO-3P	G	D	S	Tube
6N90L-T47-T	6N90G-T47-T	TO-247	G	D	S	Tube

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



(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1
TF34: TO-220F4, T2Q: TO-262,
T2ST: TO-262ST, TQ2: TO-263, T3P: TO-3P,
T47: TO-247
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	900	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	Continuous (T_C=25°C)	I_D	6.2	A
	Pulsed (Note 2)	I_{DM}	24	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	300	mJ
	Repetitive (Note 2)	E_{AR}	16.7	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220/TO-262 TO-262ST/TO-263	P_D	167	W
	TO-220F/TO220F1 TO-220F4		50	W
	TO-3P		198	W
	TO-247		167	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 = 16.6mH, I_{AS} = 6A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 6A, 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 TO220F1/TO-220F4 TO-262/TO-262ST TO-263	θ_{JA}	62.5	°C/W
	TO-3P		40	°C/W
	TO-247		50	°C/W
Junction to Case	TO-220/TO-262 TO-262ST/TO-263	θ_{JC}	0.75	°C/W
	TO-220F/TO220F1 TO-220F4		2.5	°C/W
	TO-3P		0.63	°C/W
	TO-247		0.75	°C/W

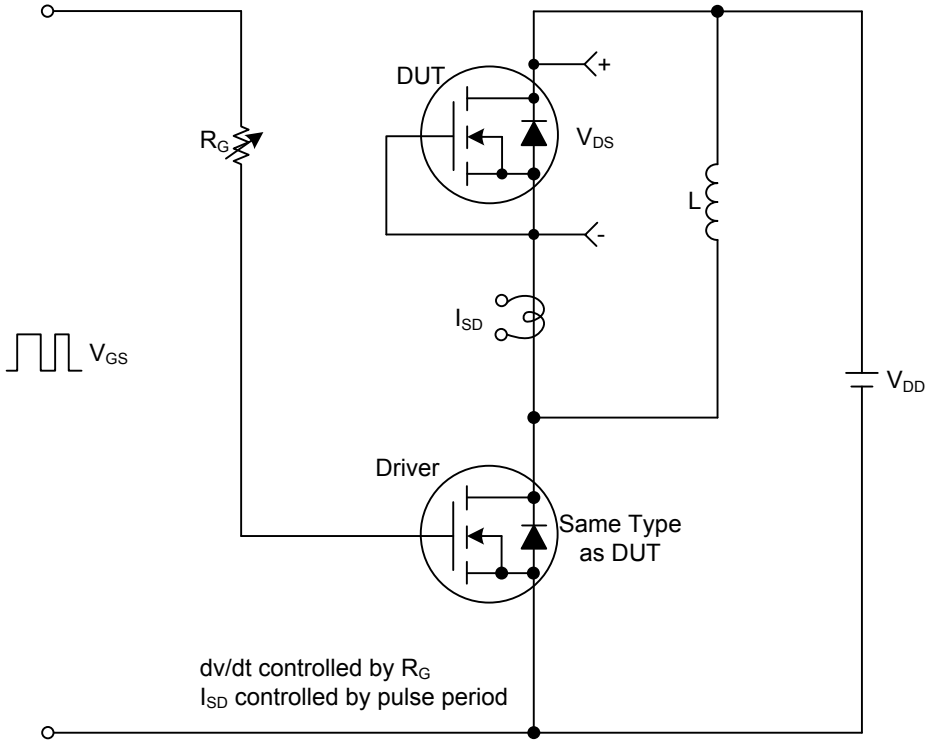
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

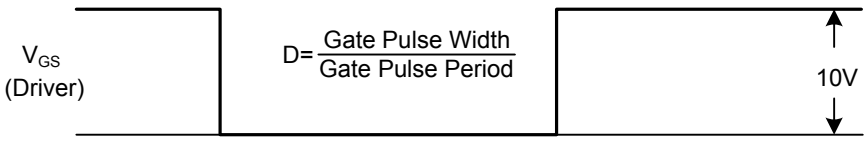
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	900			V
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	Reference to 25°C, I_D=250μA		1.07		V/°C
Drain-Source Leakage Current		I_{DSS}	V_{DS}=900V, V_{GS}=0V			10	μA
			V_{DS}=720V, T_C=125°C			100	
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	3.0		5.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=3.1A		1.85	2.3	Ω
Forward Transconductance		g_{FS}	V_{DS}=50V, I_D=3.1A (Note 1)		5.5		S
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		1260	1770	pF
Output Capacitance		C_{OSS}			160	180	pF
Reverse Transfer Capacitance		C_{RSS}			15	30	pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1, 2)		Q_G	V_{GS}=10V, V_{DS}=50V, I_D=1.3A (Note 1, 2)		40	50	nC
Gate to Source Charge		Q_{GS}			9.6		nC
Gate to Drain Charge		Q_{GD}			13		nC
Turn-ON Delay Time (Note 1, 2)		$t_{D(ON)}$	V_{DD}=30V, I_D=1A, R_G=25Ω (Note 1, 2)		75	80	ns
Rise Time		t_R			152	190	ns
Turn-OFF Delay Time		$t_{D(OFF)}$			200	240	ns
Fall-Time		t_F			110	150	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				6.0	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				24	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=6.2A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time		t_{rr}	I_S=6.2A, V_{GS}=0V, dI_F/dt=100A/μs (Note 1)		630		ns
Body Diode Reverse Recovery Charge		Q_{rr}			6.9		μC

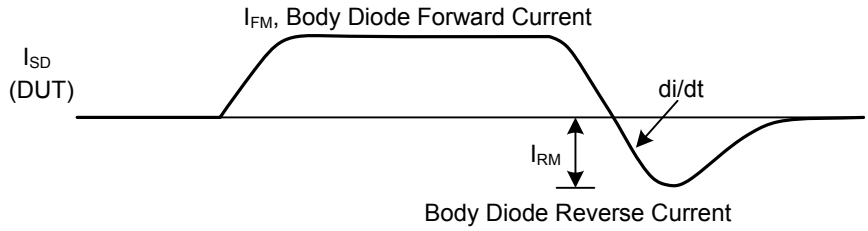
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

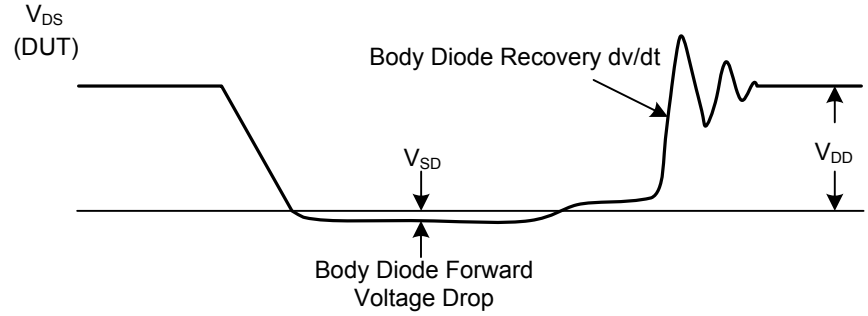
■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms

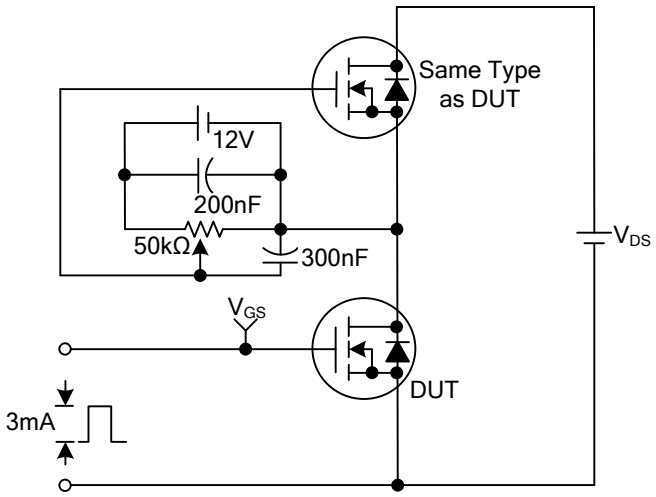




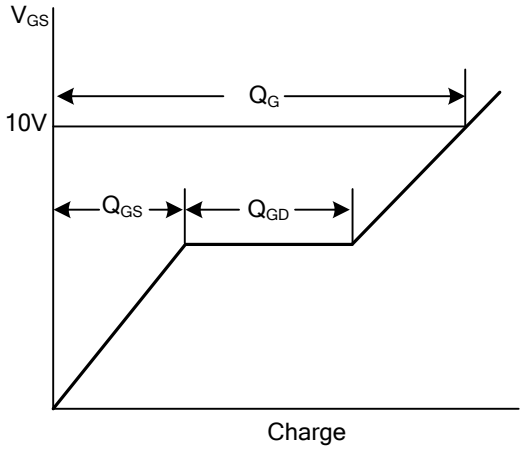




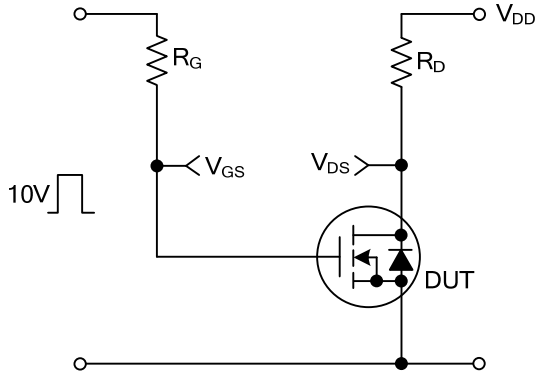
■ TEST CIRCUITS AND WAVEFORMS



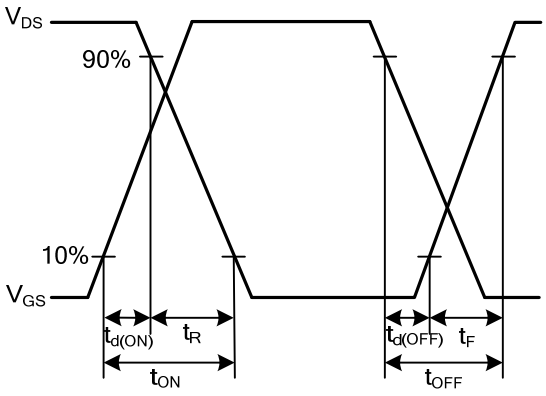
Gate Charge Test Circuit



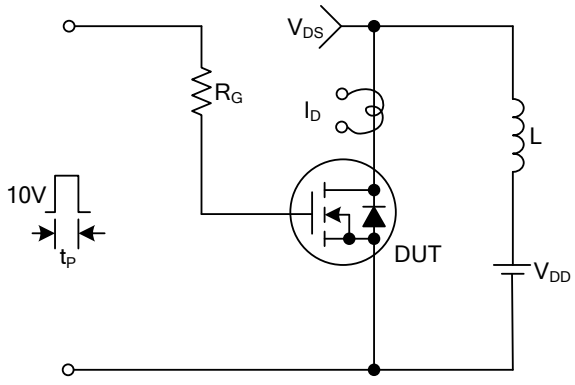
Gate Charge Waveforms



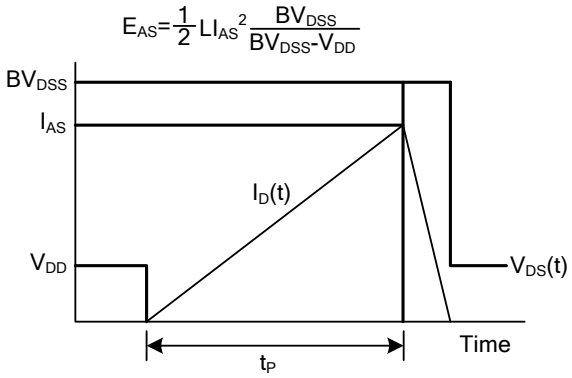
Resistive Switching Test Circuit



Resistive Switching Waveforms



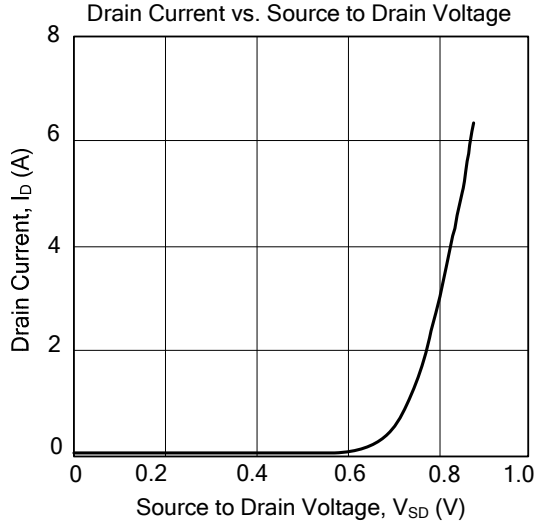
Unclamped Inductive Switching Test Circuit



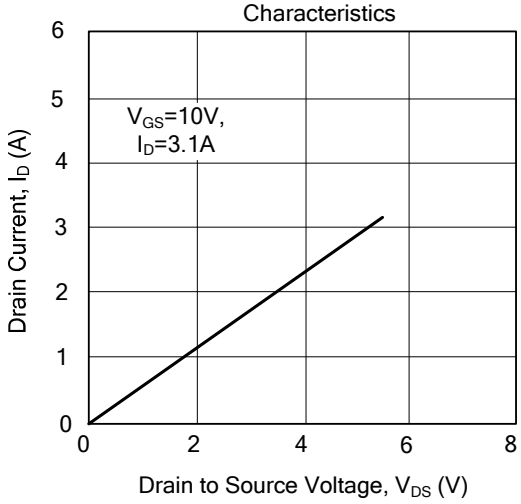
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

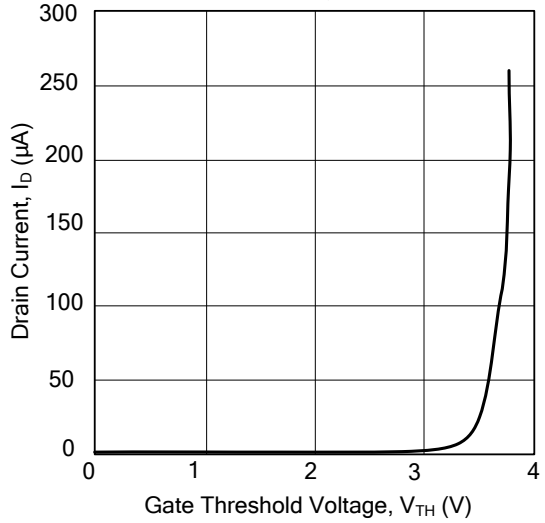
Drain Current vs. Source to Drain Voltage



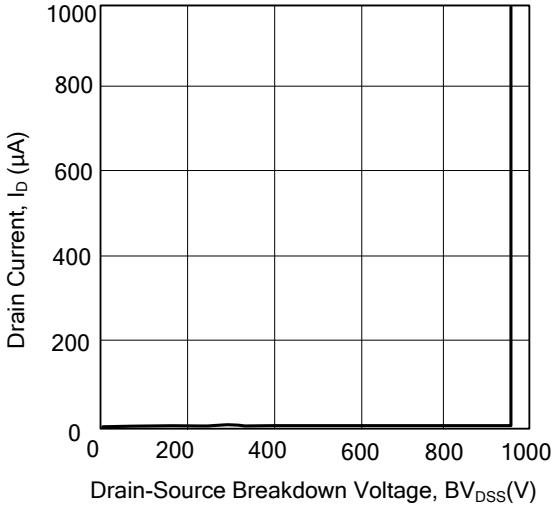
Drain-Source On-State Resistance Characteristics



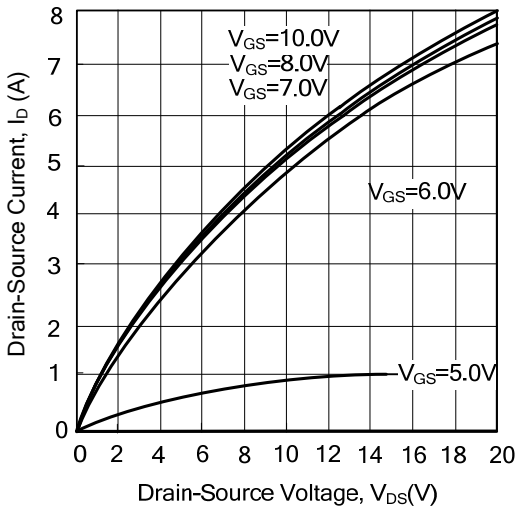
Drain Current vs. Gate Threshold Voltage



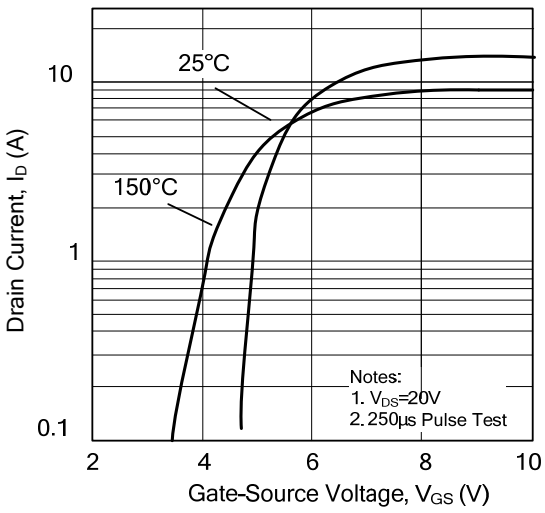
Drain Current vs. Drain-Source Breakdown Voltage



On-Resistance Characteristics



Transfer Characteristics



■ TYPICAL CHARACTERISTICS (Cont.)