



2N50Q-TA

Power MOSFET

2A, 500V N-CHANNEL POWER MOSFET

■ DESCRIPTION

The UTC **2N50Q-TA** is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient AC to DC converters and bridge circuits.

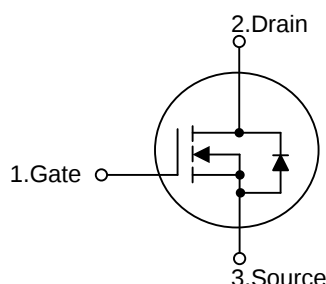
■ FEATURES

* $R_{DS(ON)} \leq 5.5\Omega$ @ $V_{GS}=10V$, $I_D=1.0A$

* High Switching Speed

* 100% Avalanche Tested

■ SYMBOL

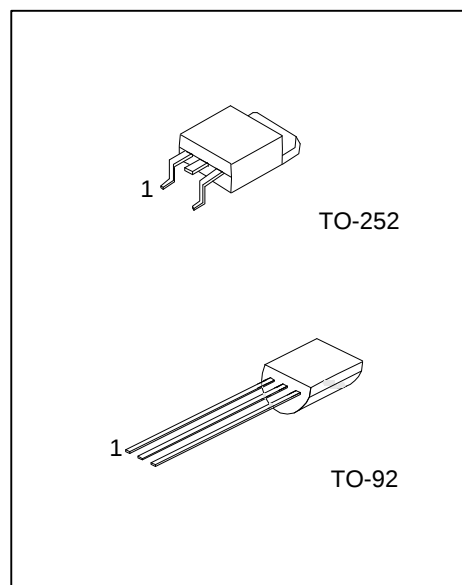


■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
2N50QL-TN3-R	2N50QG-TN3-R	TO-252	G	D	S	Tape Reel
2N50QL-T92-B	2N50QG-T92-B	TO-92	G	D	S	Tape Box
2N50QL-T92-K	2N50QG-T92-K	TO-92	G	D	S	Bulk

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

2N50QG-TN3-R (1) Packing Type (2) Package Type (3) Green Package	(1) R: Tape Reel, B: Tape Box, K: Bulk (2) TN3: TO-252, T92: TO-92 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING

TO-252	TO-92
UTC 2N50Q Lot Code 1 L: Lead Free G: Halogen Free Date Code	UTC 2N50Q Lot Code 1 L: Lead Free G: Halogen Free Date Code

■ **ABSOLUTE MAXIMUM RATINGS** ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	2	A
	Pulsed (Note 2)	I_{DM}	4	A
Avalanche Current (Note 2)		I_{AR}	1.4	A
Avalanche Energy (Note 3)	Single Pulsed	E_{AS}	40	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.4	V/ns
Power Dissipation	TO-252	P_D	30	W
	TO-92		1.42	W
Junction Temperature		T_J	+150	$^{\circ}\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^{\circ}\text{C}$

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. $L=41\text{mH}$, $I_{AS}=1.4\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD}\leq 2.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252	θ_{JA}	110	$^{\circ}\text{C/W}$
	TO-92		60	$^{\circ}\text{C/W}$
Junction to Case	TO-252	θ_{JC}	4.17 (Note)	$^{\circ}\text{C/W}$
	TO-92		88	$^{\circ}\text{C/W}$

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

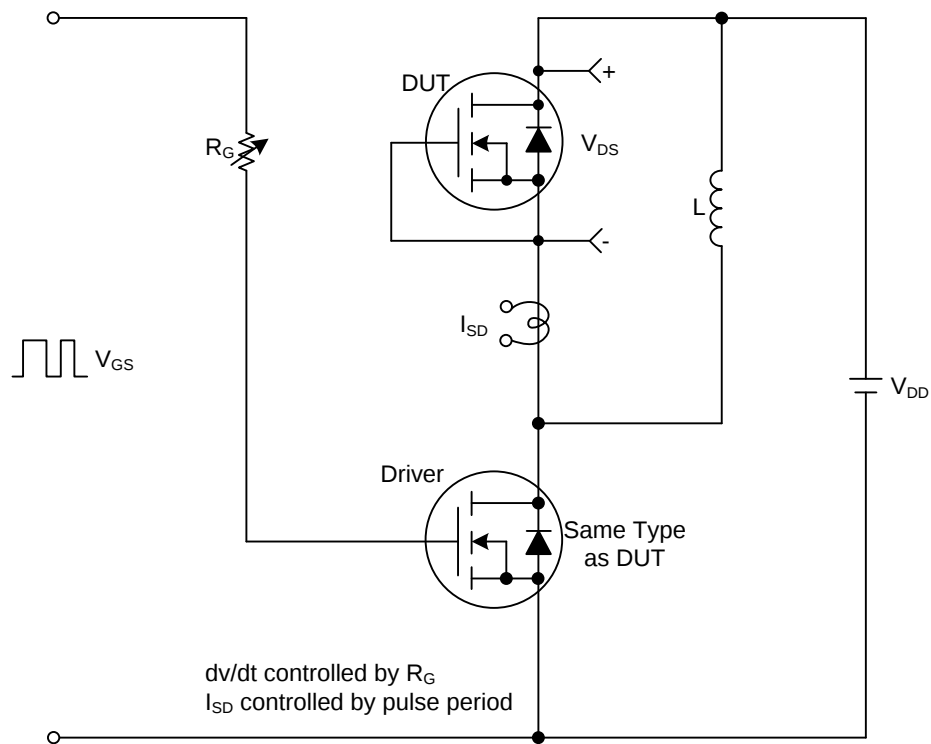
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise noted)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	500			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =500V, 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 =1.0A			5.5	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		140		pF
Output Capacitance		C _{OSS}			22		pF
Reverse Transfer Capacitance		C _{RSS}			3		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =400V, V _{GS} =10V, I _D =2A, I _G =1mA (Note 1, 2)		4.9		nC
Gate to Source Charge		Q _{GS}			2.3		nC
Gate to Drain Charge		Q _{GD}			0.8		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =100V, V _{GS} =1.0V, I _D =2A, R _G =25Ω (Note 1, 2)		4		ns
Rise Time		t _R			15		ns
Turn-OFF Delay Time		t _{D(OFF)}			12		ns
Fall-Time		t _F			24		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				2	A
Maximum Body-Diode Pulsed Current		I _{SM}				4	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =2.0A, V _{GS} =0V			1.2	V
Reverse Recovery Time		t _{RR}	V _{GS} =0V, I _{SD} =2.0A, di/dt=100A/μs		280		ns
Reverse Recovery Charge		Q _{RR}			0.58		μC

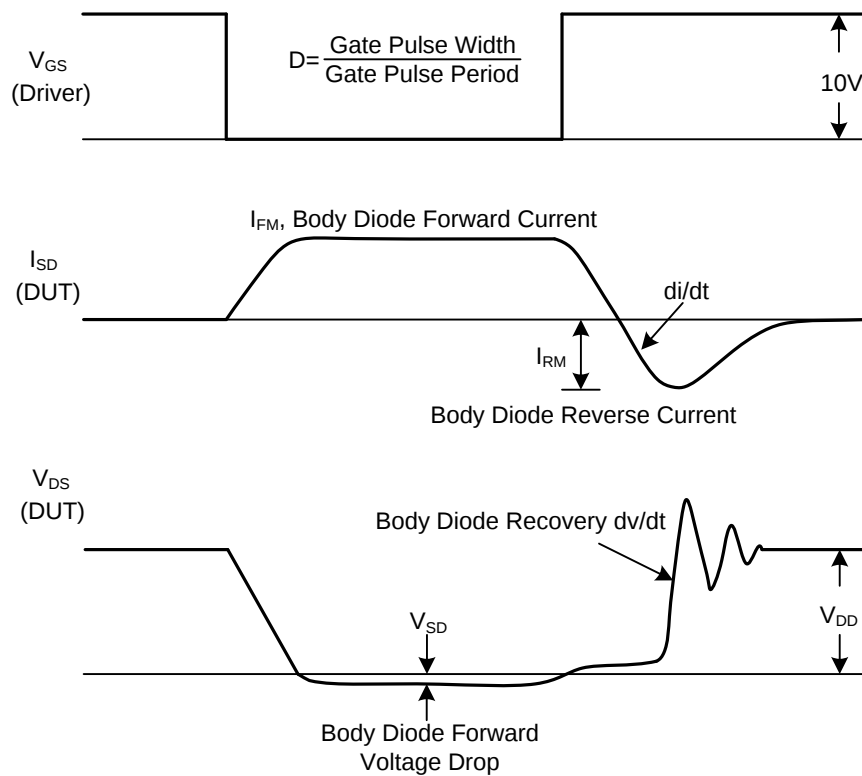
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

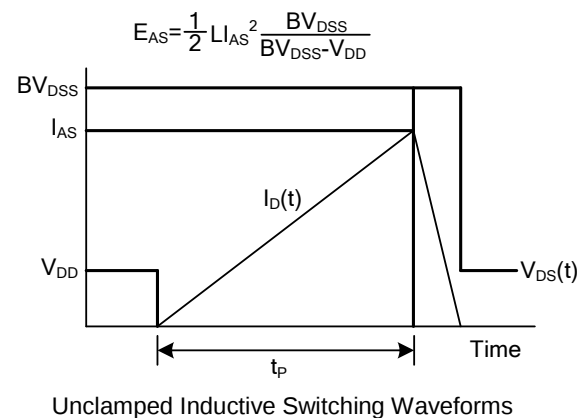
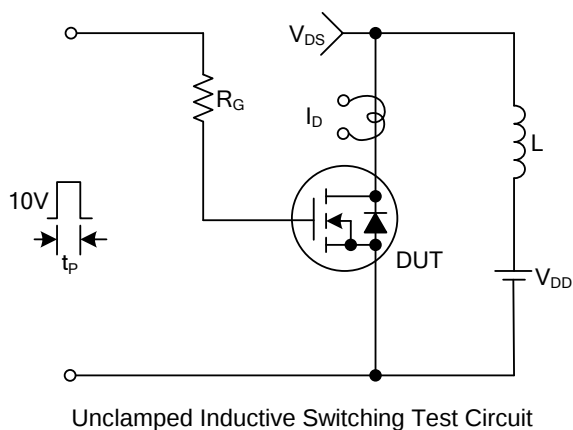
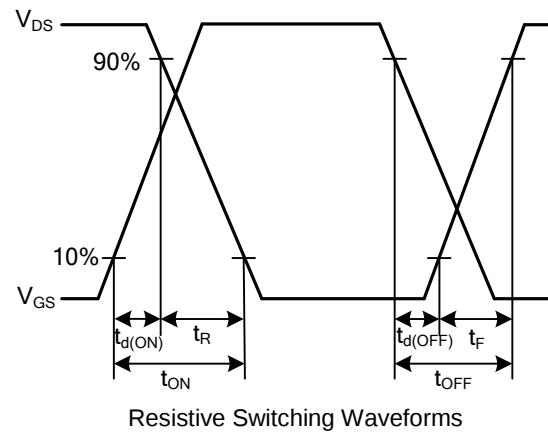
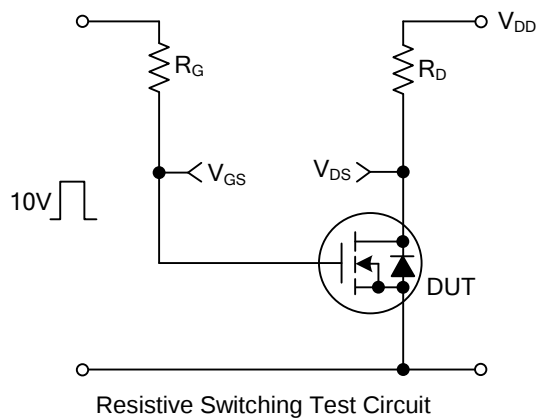
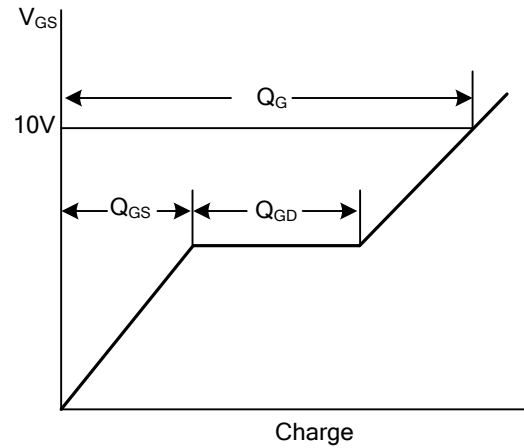
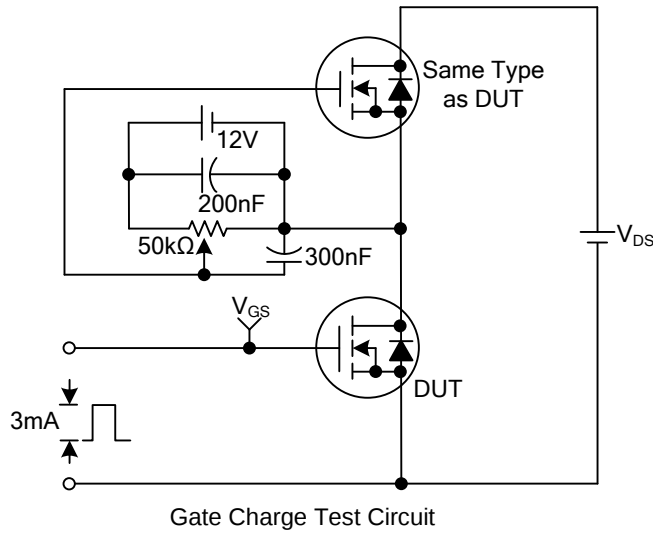
■ TEST CIRCUITS AND WAVEFORMS



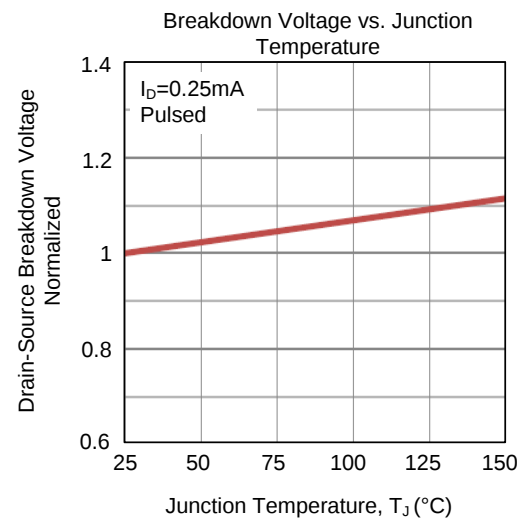
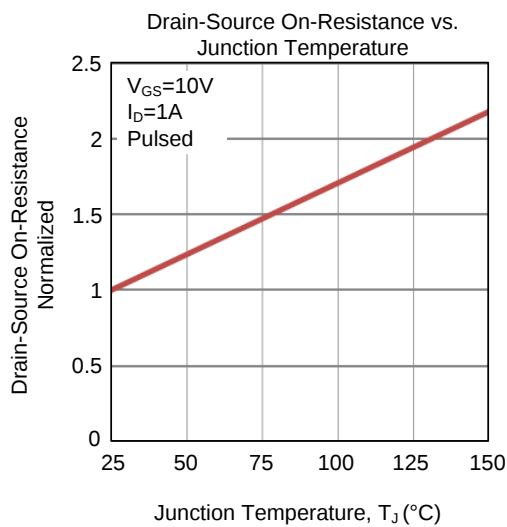
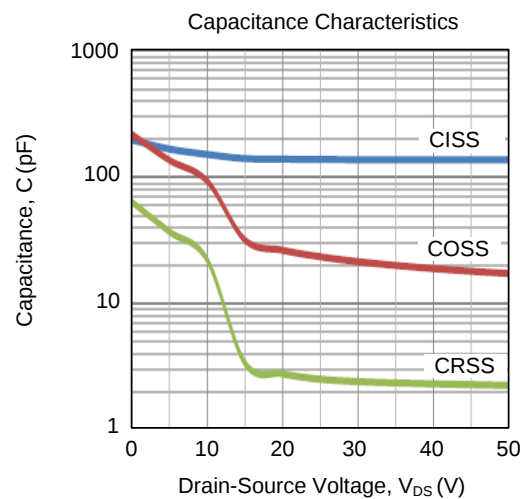
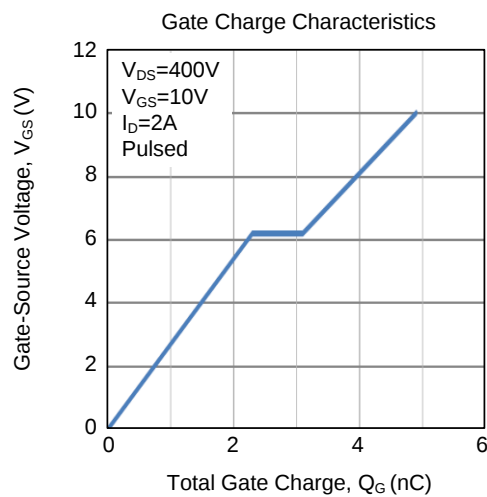
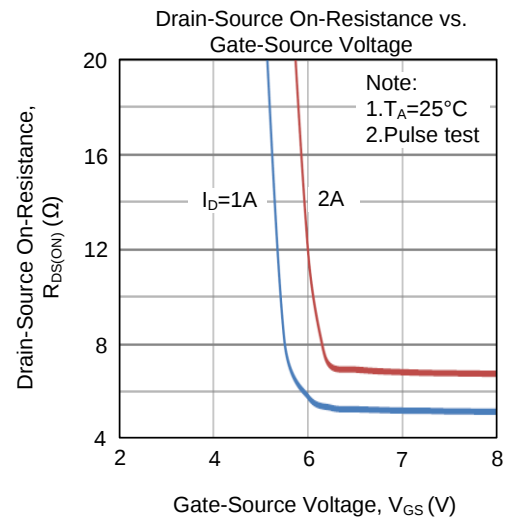
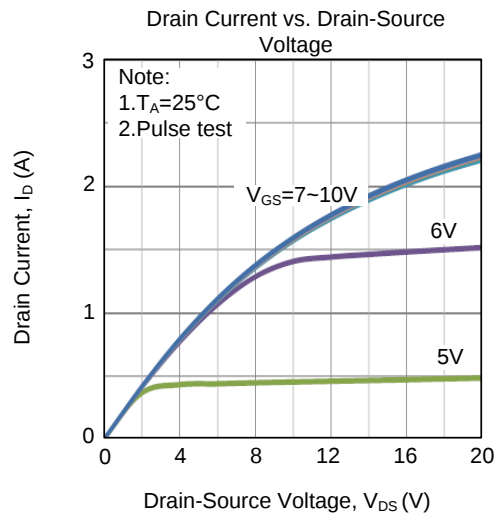
Peak Diode Recovery dv/dt Test Circuit & Waveforms



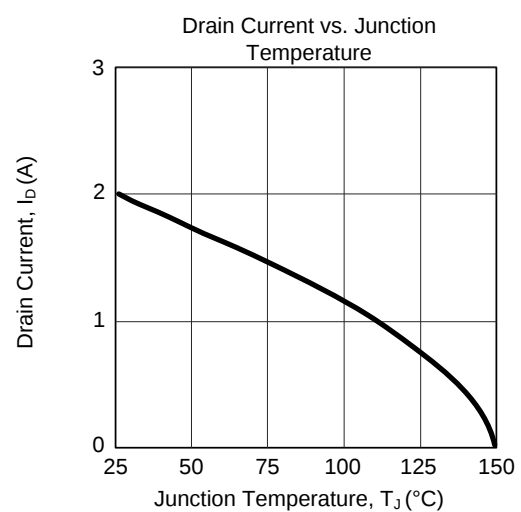
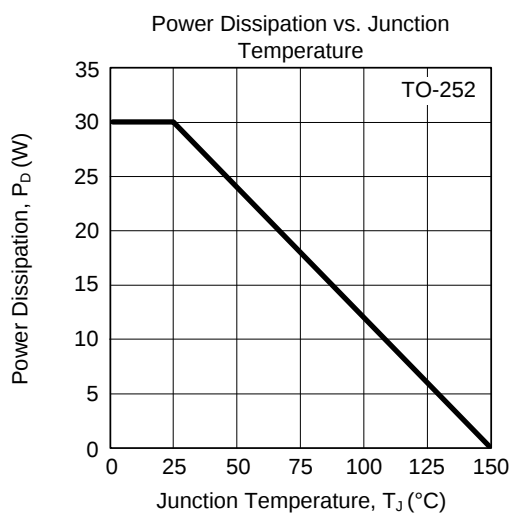
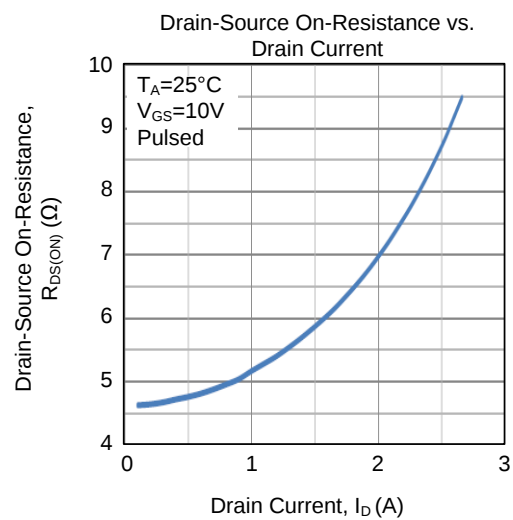
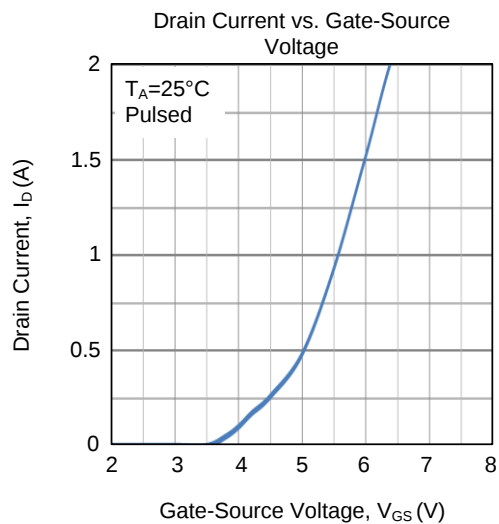
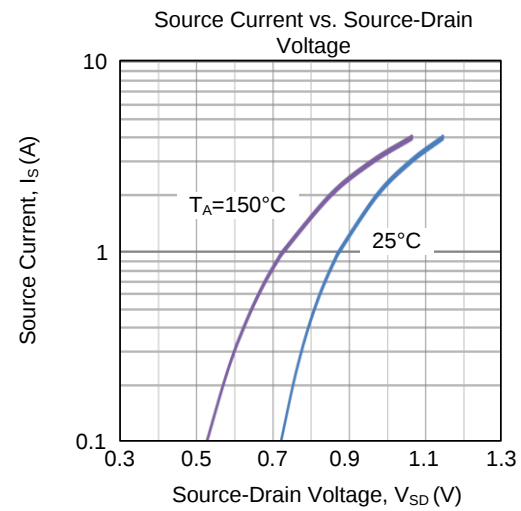
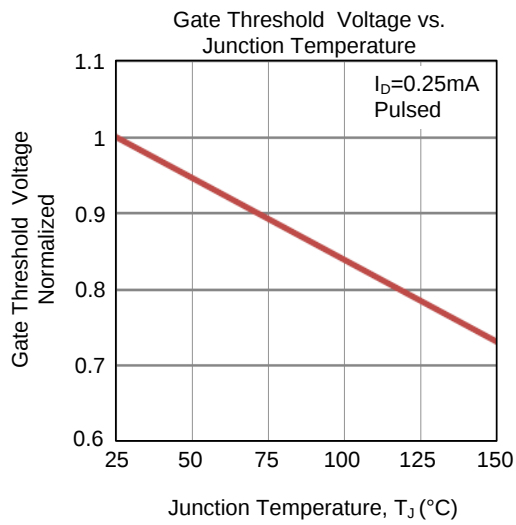
■ TEST CIRCUITS AND WAVEFORMS



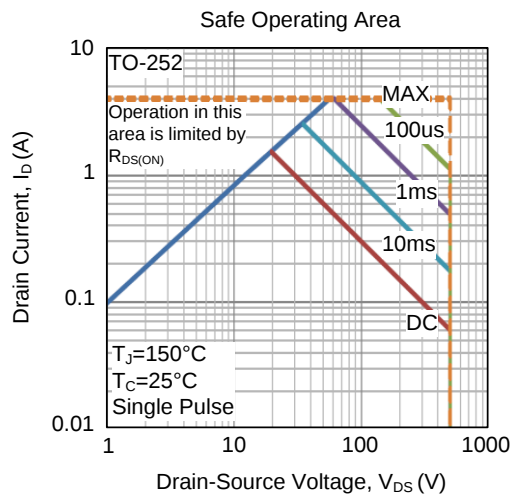
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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