



8N40K-MTQ

Power MOSFET

8A, 400V N-CHANNEL POWER MOSFET

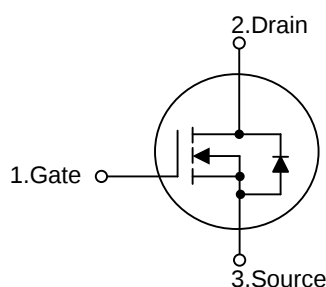
DESCRIPTION

The UTC **8N40K-MTQ** is an N-channel power MOSFET using UTC's advanced technology to provide the customers with minimum on-state resistance, superior switching performance and withstand high energy pulse in the avalanche and commutation mode.

FEATURES

- * $R_{DS(ON)} \leq 0.75 \Omega$ @ $V_{GS}=10V$, $I_D=4.0A$
- * High switching speed
- * 100% avalanche tested

SYMBOL

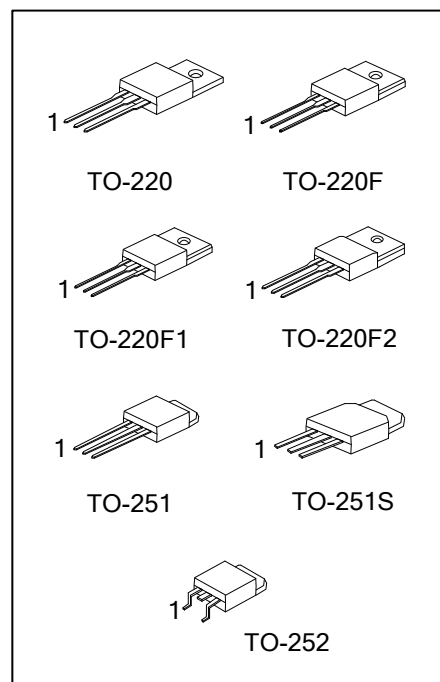


ORDERING INFORMATION

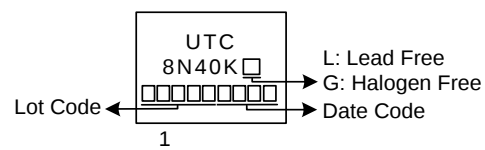
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
8N40KL-TA3-T	8N40KG-TA3-T	TO-220	G	D	S	Tube
8N40KL-TF1-T	8N40KG-TF1-T	TO-220F1	G	D	S	Tube
8N40KL-TF2-T	8N40KG-TF2-T	TO-220F2	G	D	S	Tube
8N40KL-TF3-T	8N40KG-TF3-T	TO-220F	G	D	S	Tube
8N40KL-TM3-T	8N40KG-TM3-T	TO-251	G	D	S	Tube
8N40KL-TMS-T	8N40KG-TMS-T	TO-251S	G	D	S	Tube
8N40KL-TN3-R	8N40KG-TN3-R	TO-252	G	D	S	Tape Reel

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

8N40KG-TA3-T (1) Packing Type (2) Package Type (3) Green Package		(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, TMS: TO-251S, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	400	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous ($T_C=25^{\circ}\text{C}$)	I_D	8	A
	Pulsed (Note 2)	I_{DM}	32	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	210	mJ
	Repetitive (Note 2)	E_{AR}	2.5	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.4	V/ns
Power Dissipation	TO-220	P_D	95	W
	TO-220F/TO-220F1		32	W
	TO-220F2			
	TO-251/TO-251S TO-252		52	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. $L = 6.6\text{mH}$, $I_{AS} = 8.0\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq 8.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-251/TO-251S TO-252		110	
Junction to Case	TO-220	θ_{JC}	1.3	$^{\circ}\text{C}/\text{W}$
	TO-220F/TO-220F1 TO-220F2		3.9	
	TO-251/TO-251S TO-252		2.4	

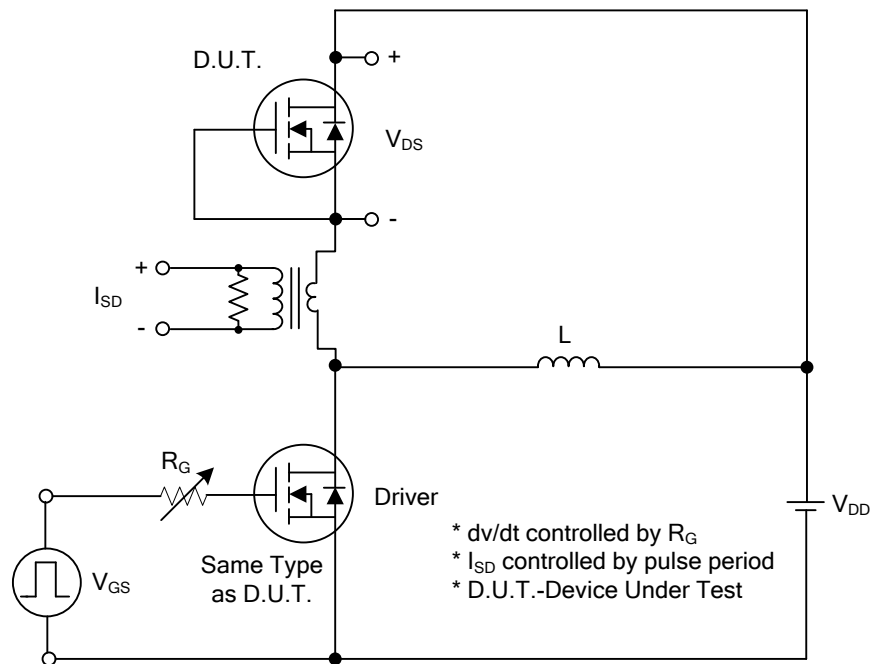
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	400			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =400V, 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 =4A			0.75	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		740		pF
Output Capacitance		C _{OSS}			92		pF
Reverse Transfer Capacitance		C _{RSS}			6		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =320V, V _{GS} =10V, I _D =8A I _G =1mA (Note 1, 2)		16		nC
Gate to Source Charge		Q _{GS}			5		nC
Gate to Drain Charge		Q _{GD}			3		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =8A, R _G =25Ω (Note 1, 2)		9		ns
Rise Time		t _R			20		ns
Turn-OFF Delay Time		t _{D(OFF)}			42		ns
Fall-Time		t _F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				8	A
Maximum Body-Diode Pulsed Current		I _{SM}				32	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =8A, V _{GS} =0V			1.4	V
Reverse Recovery Time		t _{rr}	V _{GS} =0V, I _S =8A, di/dt=100A/μs		252		ns
Reverse Recovery Charge		Q _{rr}			4.7		μC

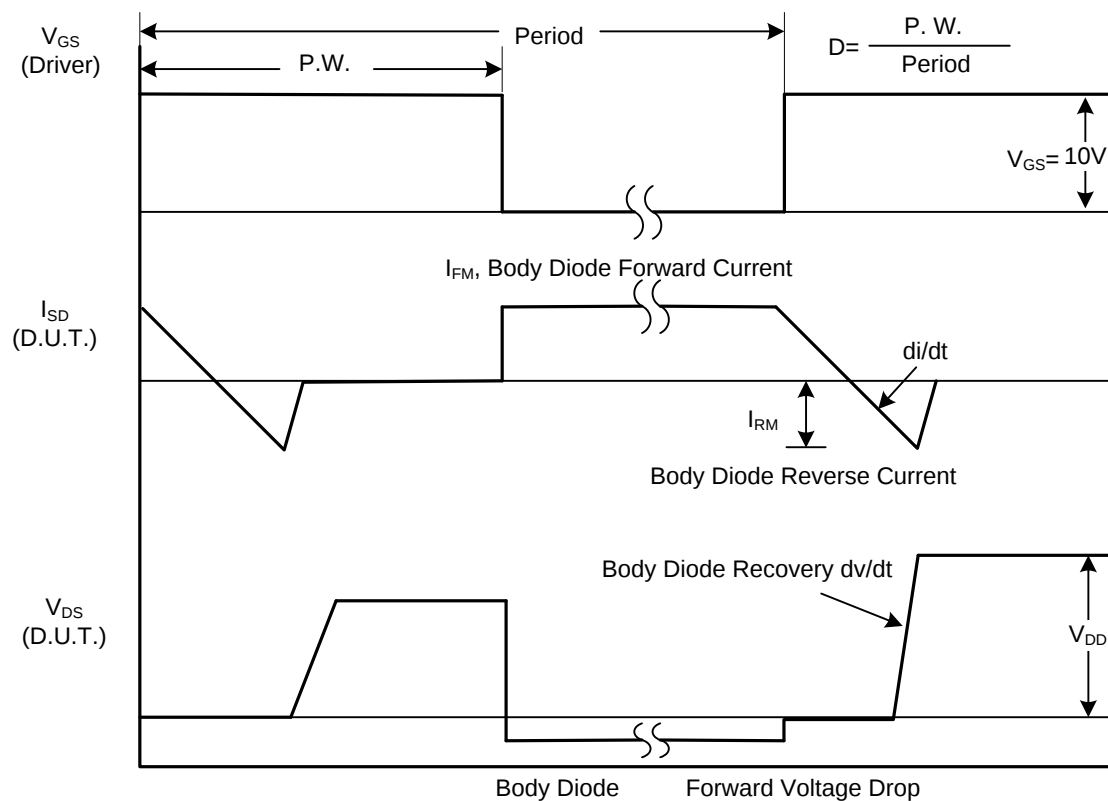
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

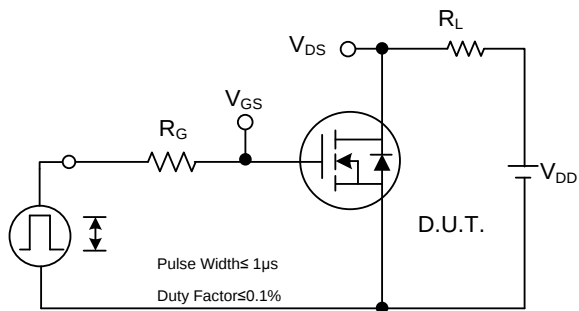


Peak Diode Recovery dv/dt Test Circuit

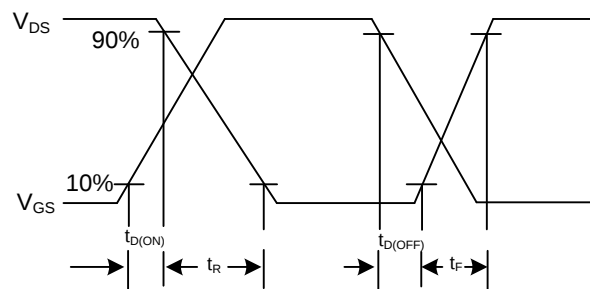


Peak Diode Recovery dv/dt Waveforms

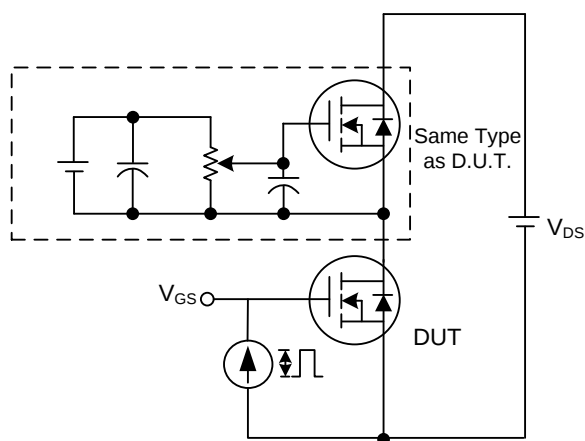
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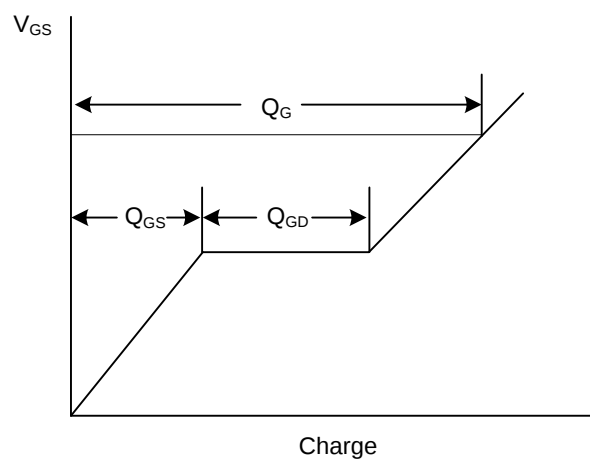
Switching Test Circuit



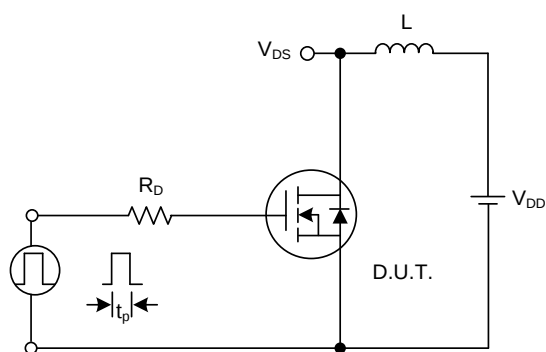
Switching Waveforms



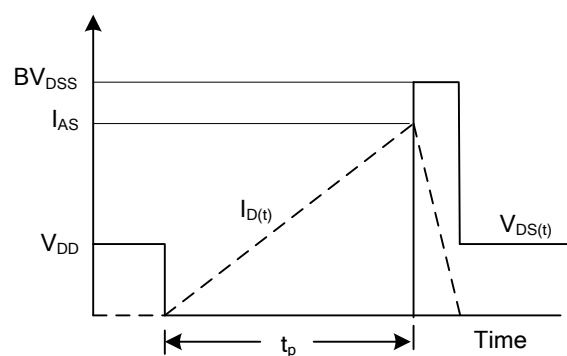
Gate Charge Test Circuit



Gate Charge Waveform

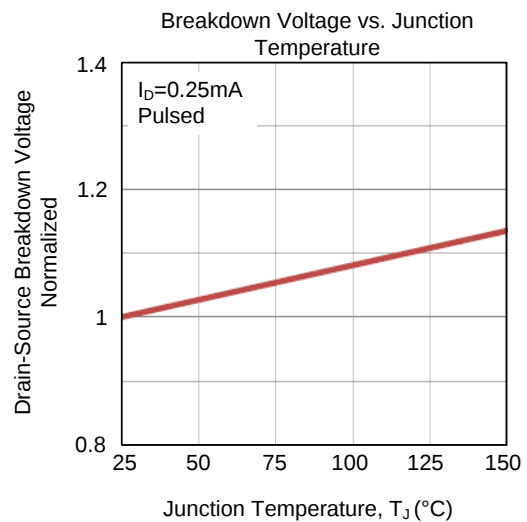
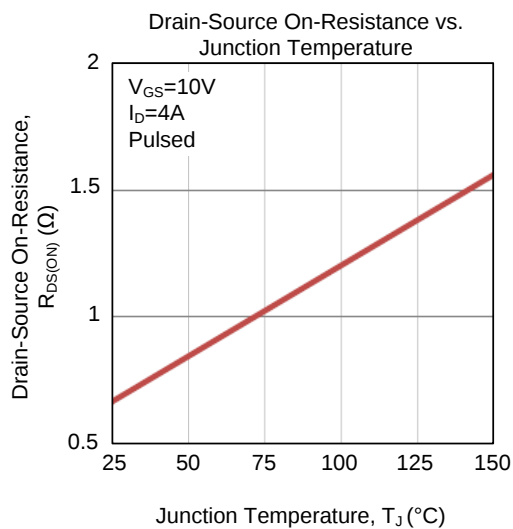
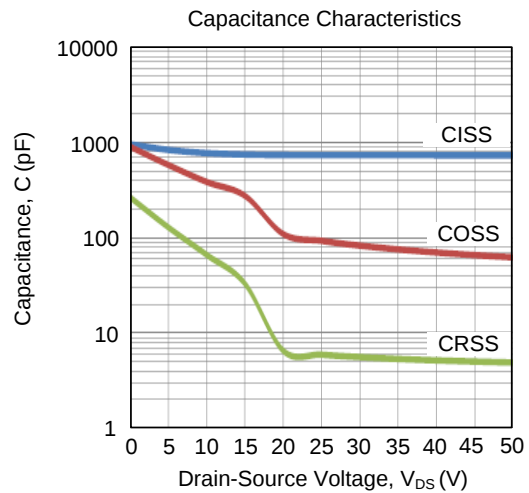
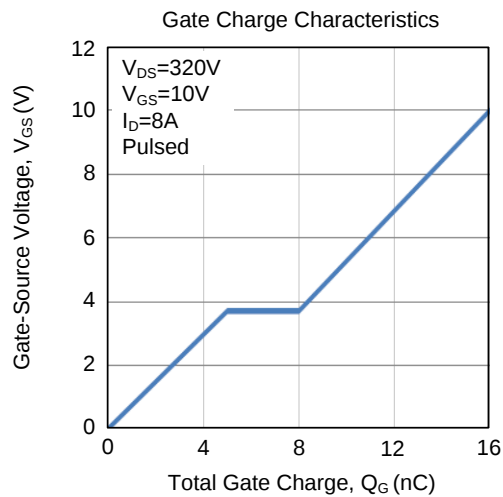
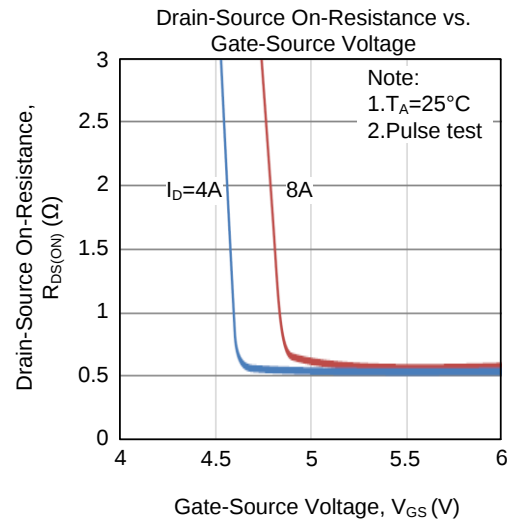
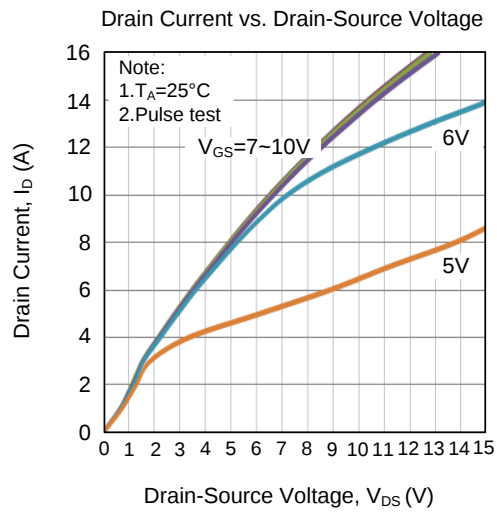


Unclamped Inductive Switching Test Circuit

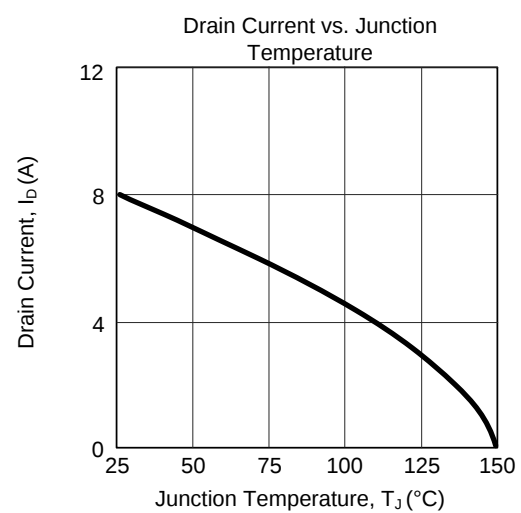
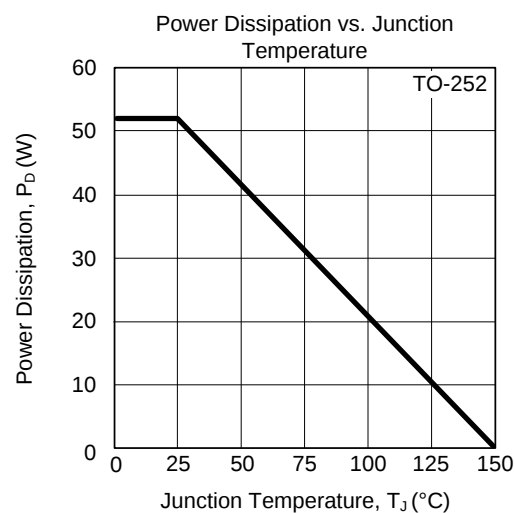
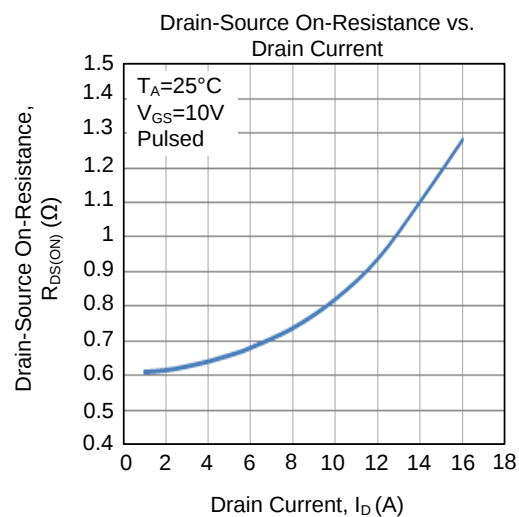
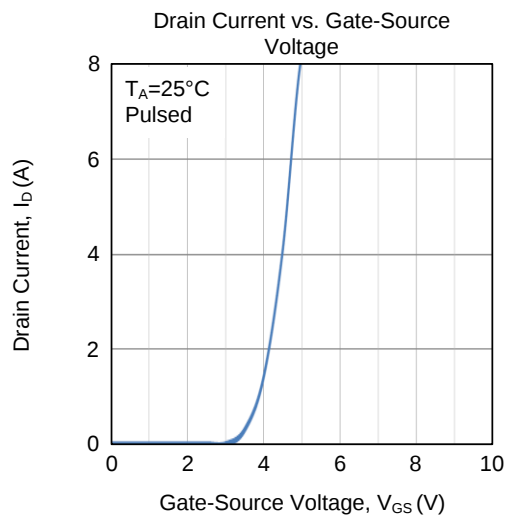
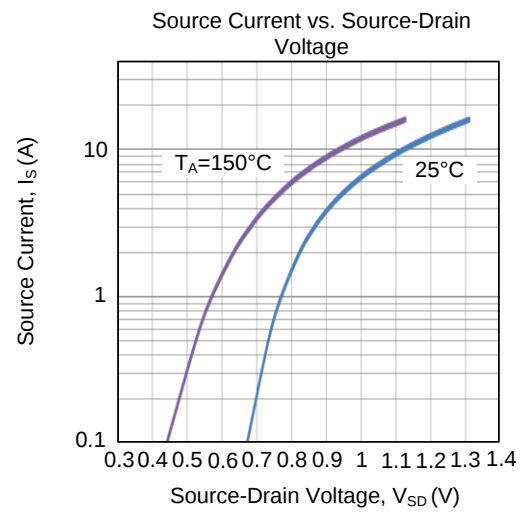
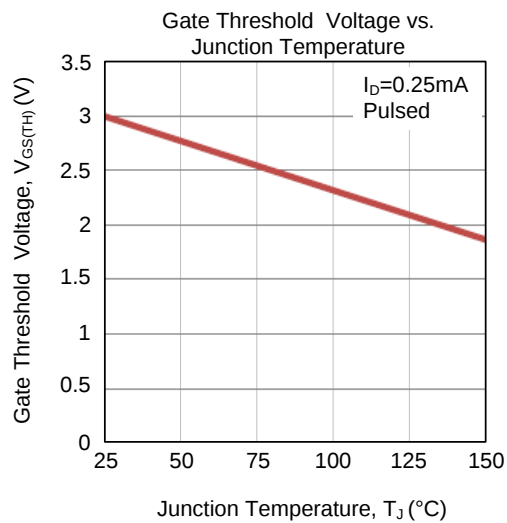


Unclamped Inductive Switching Waveforms

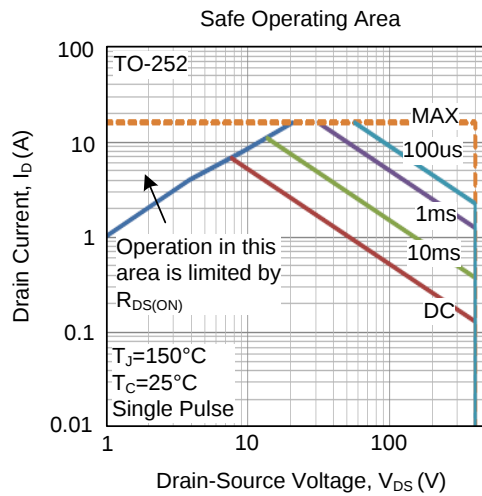
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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