



8N65K-MTQ

Power MOSFET

8A, 650V N-CHANNEL POWER MOSFET

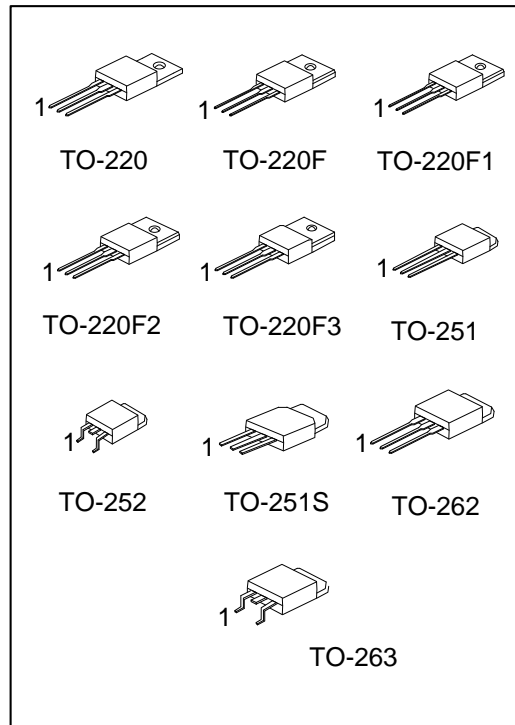
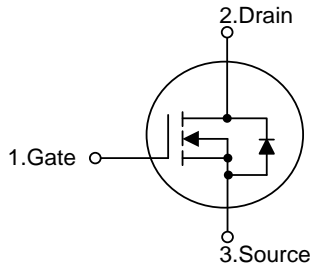
DESCRIPTION

The UTC 8N65K-MTQ is a high voltage and high current power MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics. This power MOSFET is usually used in high speed switching applications at power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

FEATURES

- * $R_{DS(ON)} \leq 1.4 \Omega$ @ $V_{GS}=10V, I_D=4.0A$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

SYMBOL



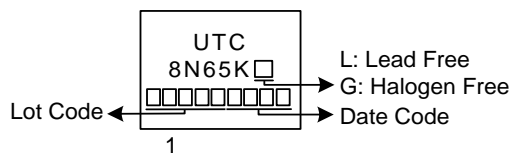
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
8N65KL-TA3-T	8N65KG-TA3-T	TO-220	G	D	S	Tube
8N65KL-TF3-T	8N65KG-TF3-T	TO-220F	G	D	S	Tube
8N65KL-TF1-T	8N65KG-TF1-T	TO-220F1	G	D	S	Tube
8N65KL-TF2-T	8N65KG-TF2-T	TO-220F2	G	D	S	Tube
8N65KL-TF3T-T	8N65KG-TF3T-T	TO-220F3	G	D	S	Tube
8N65KL-TM3-T	8N65KG-TM3-T	TO-251	G	D	S	Tube
8N65KL-TMS-T	8N65KG-TMS-T	TO-251S	G	D	S	Tube
8N65KL-TN3-R	8N65KG-TN3-R	TO-252	G	D	S	Tape Reel
8N65KL-T2Q-T	8N65KG-T2Q-T	TO-262	G	D	S	Tube
8N65KL-TQ2-T	8N65KG-TQ2-T	TO-263	G	D	S	Tube
8N65KL-TQ2-R	8N65KG-TQ2-R	TO-263	G	D	S	Tape Reel

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

<p>8N65KG-TA3-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TF3T: TO-220F3, TM3: TO-251, TMS: TO-251S, TN3: TO-252, T2Q: TO-262, TQ2: TO-263</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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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}	650	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	8	A
	Pulsed (Note 2)	I_{DM}	32	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	105	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.66	V/ns
Power Dissipation	TO-220/TO-262/TO-263	P_D	125	W
	TO-220F/TO-220F1 TO-220F2/TO-220F3		38	W
	TO-251/TO-251S TO-252		55	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Operating Temperature		T_{OPR}	-55 ~ +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. $L=10\text{mH}$, $I_{AS}=4.6\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, 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	RATING	UNIT
Junction to Ambient	TO-220/ TO-220F TO-220F1/TO-220F2 TO-220F3/TO-262 TO-263	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-251/TO-251S TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220/TO-262/TO-263	θ_{JC}	1	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1 TO-220F2/TO-220F3		3.29	$^\circ\text{C}/\text{W}$
	TO-251/TO-251S TO-252		2.27 (Note)	$^\circ\text{C}/\text{W}$

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

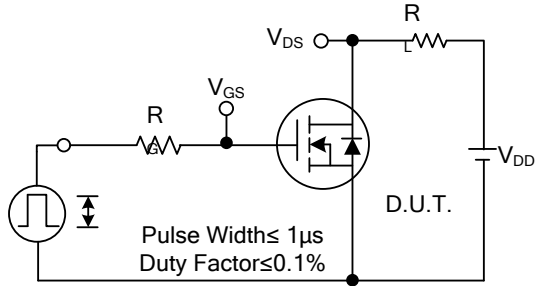
■ **ELECTRICAL CHARACTERISTICS** ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse				-100	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu A$, Referenced to 25°C		0.7		$V/^\circ\text{C}$
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=4.0A$			1.4	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$		988		pF
Output Capacitance	C_{OSS}			92		pF
Reverse Transfer Capacitance	C_{RSS}			5.5		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q_G	$V_{DS}=520V, V_{GS}=10V, I_D=8A$ $I_G=1\text{mA}$ (Note 1, 2)	15	21	30	nC
Gate-Source Charge	Q_{GS}			5.8		nC
Gate-Drain Charge	Q_{GD}			3.5		nC
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=100V, V_{GS}=10V, I_D=8A$, $R_G=25\Omega$ (Note 1, 2)		14		ns
Turn-On Rise Time	t_R			16		ns
Turn-Off Delay Time	$t_{D(OFF)}$			62		ns
Turn-Off Fall Time	t_F			25		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				8	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				32	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=8A, V_{GS}=0V$			1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_S=8A, V_{GS}=0V, V_R=400V$, $di/dt=100A/\mu s$		344		ns
Body Diode Reverse Recovery Charge	Q_{rr}			3.8		μC

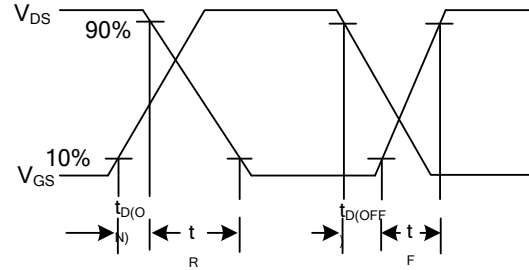
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

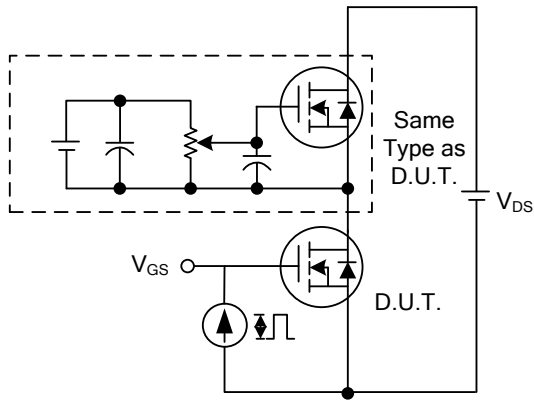
TEST CIRCUITS AND WAVEFORMS



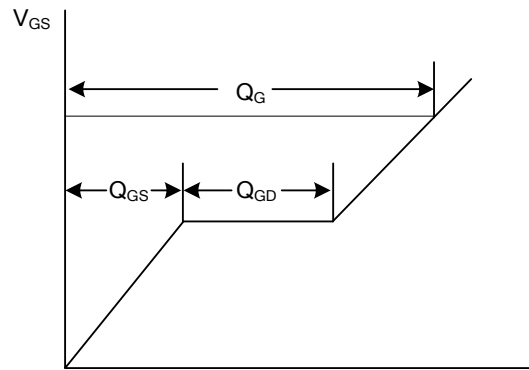
Switching Test Circuit



Switching Waveforms

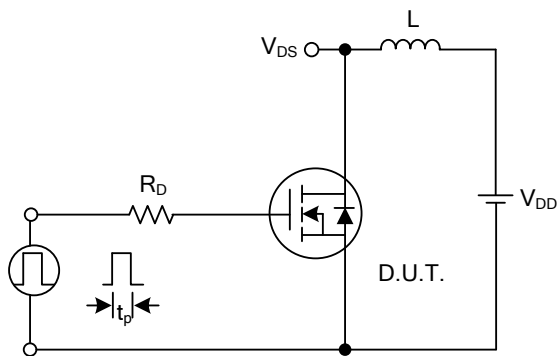


Gate Charge Test Circuit

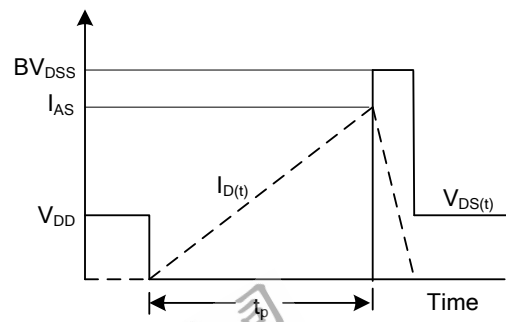


Charge

Gate Charge Waveform

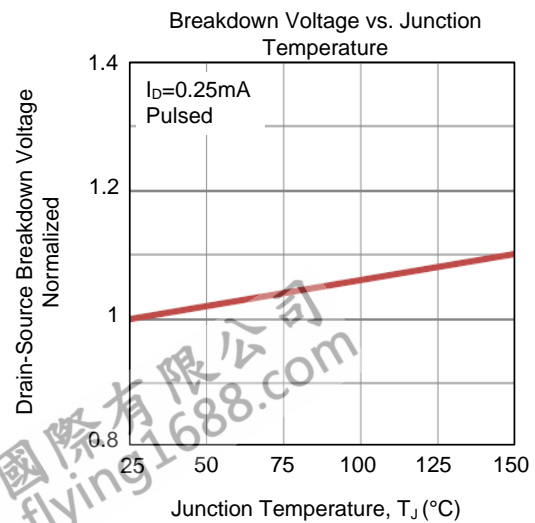
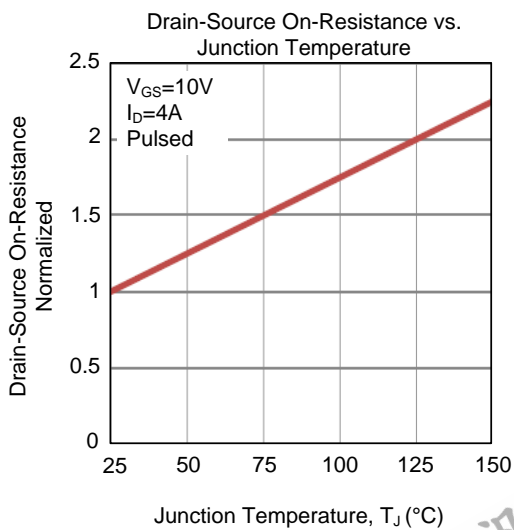
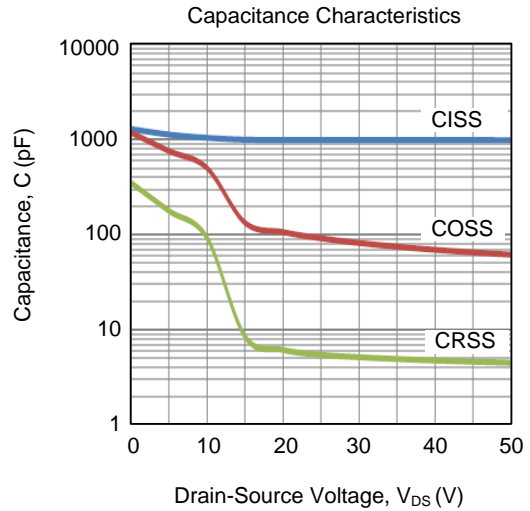
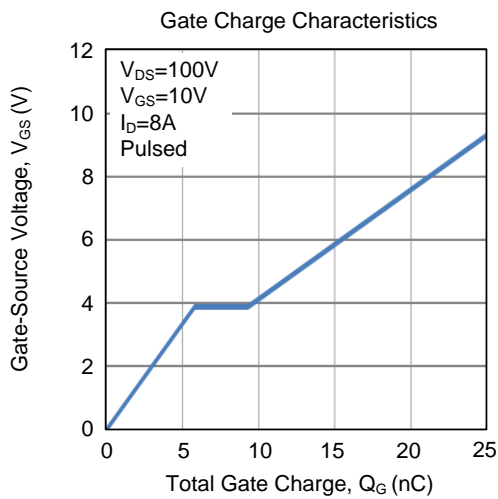
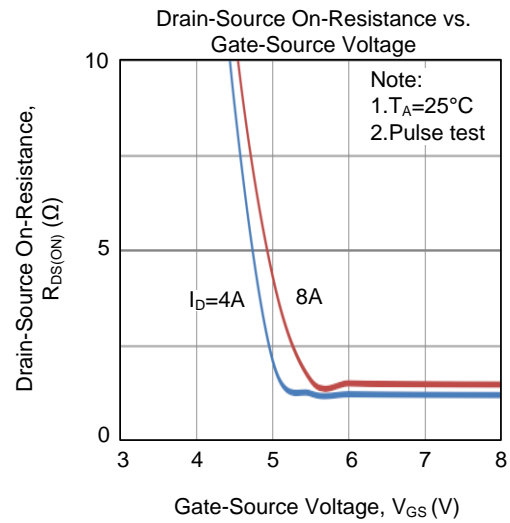
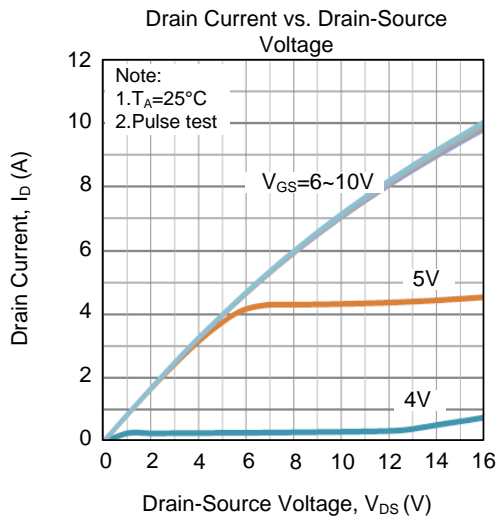


Unclamped Inductive Switching Test Circuit

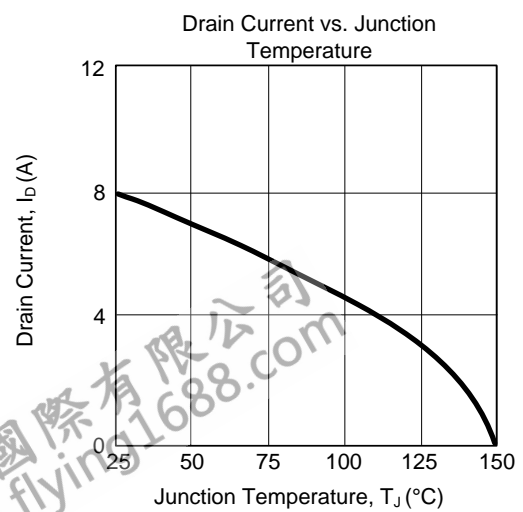
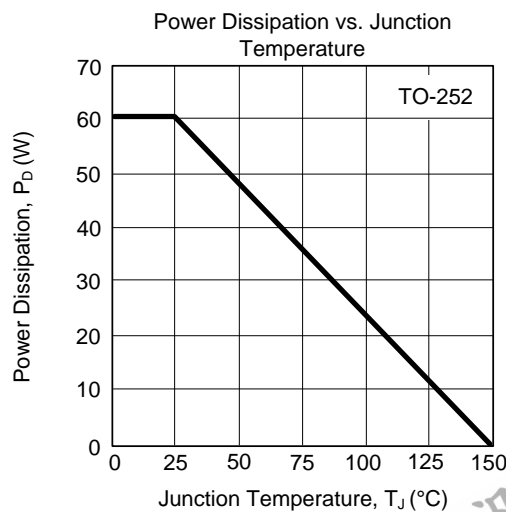
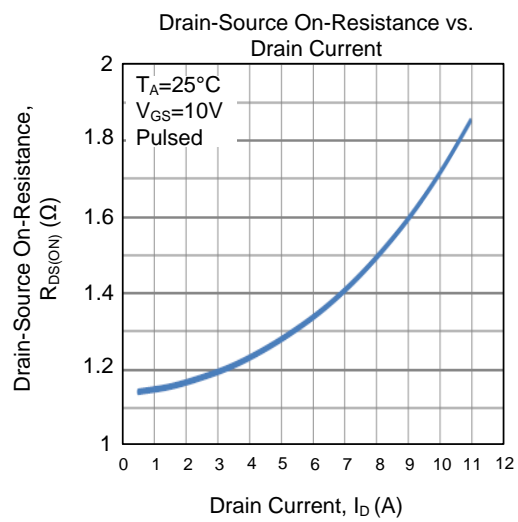
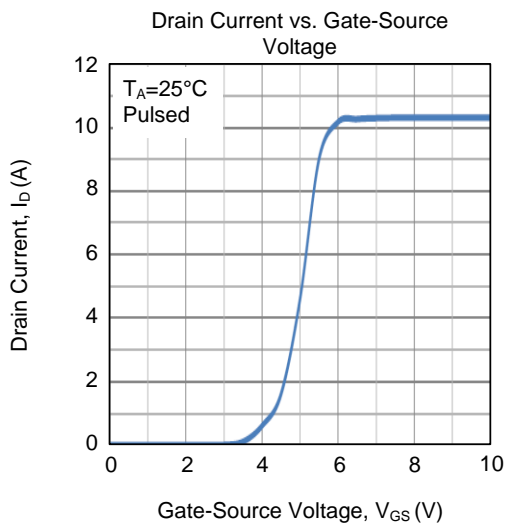
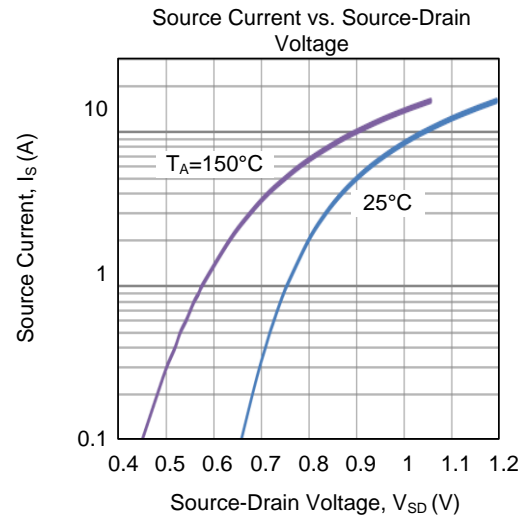
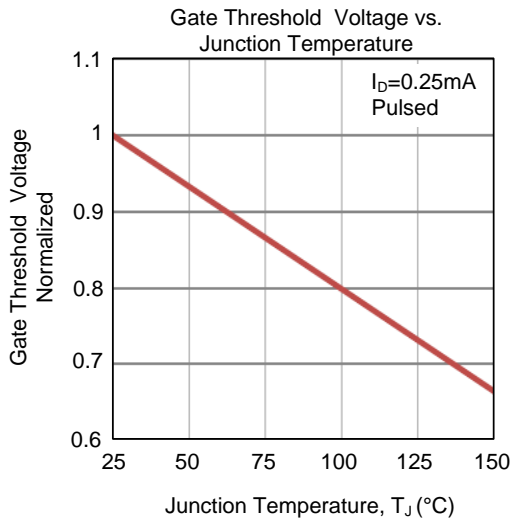


Unclamped Inductive Switching Waveforms

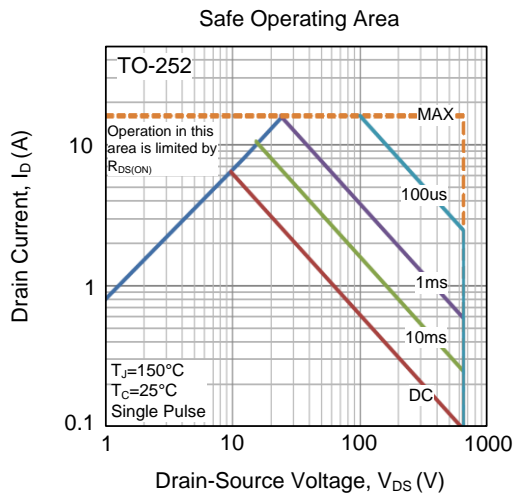
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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