



38N60-ML

Power MOSFET

38A, 600V N-CHANNEL POWER MOSFET

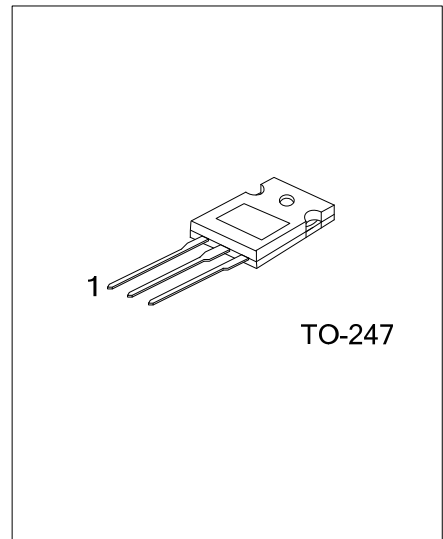
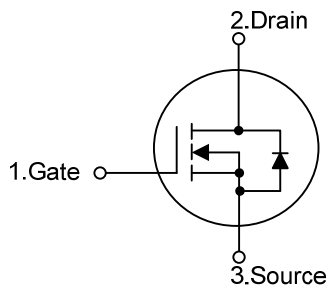
DESCRIPTION

The UTC **38N60-ML** is a high voltage power MOSFET combines advanced planar 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 of switching power supplies and adaptors.

FEATURES

- * $R_{DS(ON)} \leq 0.13 \Omega @ V_{GS}=10V, I_D=19A$
- * High Switching Speed
- * Lower gate charge results
- * Enhanced dV/dt capabilities
- * Higher gate voltage threshold

SYMBOL



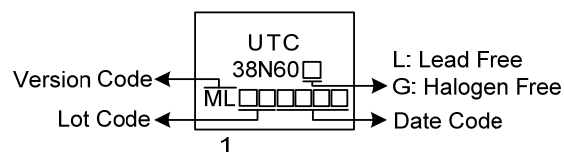
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
38N60L-ML-T47-T	38N60G-ML-T47-T	TO-247	G	D	S	Tube

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

<p>38N60G-ML-T47-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Version Code</p> <p>(4) Green Package</p>	<p>(1) T: Tube</p> <p>(2) T47: TO-247</p> <p>(3) Version ML</p> <p>(4) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



■ ABSOLUTE MAXIMUM RATINGS (unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V_{DSS}	600	V
Gate-Source Voltage	V_{GSS}	± 30	V
Continuous Drain Current	Continuous	I_D	38
	Pulsed	I_{DM}	76
Single Pulsed Avalanche Energy	E_{AS}	484	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	7.3	V/ns
Power Dissipation	P_D	540	W
Junction Temperature	T_J	+150	$^{\circ}C$
Storage Temperature	T_{STG}	-55 ~ +150	$^{\circ}C$

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. $L = 1mH$, $I_{AS} = 38A$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}C$

4. $I_{SD} \leq 30A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}C$

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	40	$^{\circ}C/W$
Junction to Case	θ_{JC}	0.23	$^{\circ}C/W$

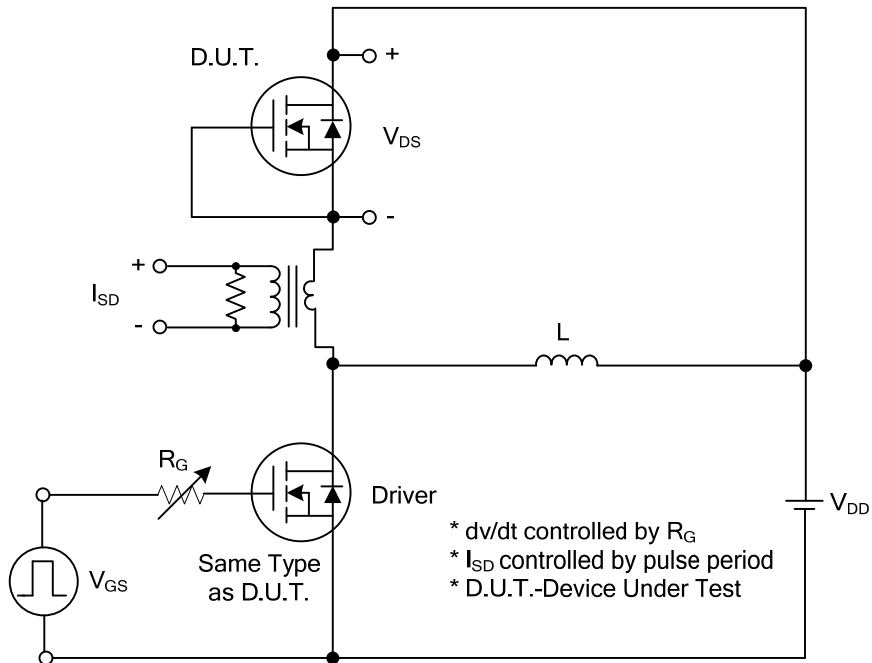
■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu A$, $V_{GS}=0V$	600			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=600V$, $V_{GS}=0V$			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}			+100	nA
	Reverse				-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu A$	3.0		5.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V$, $I_D=19A$			0.13	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0V$, $V_{DS}=25V$, $f=1.0MHz$		9986		pF
Output Capacitance	C_{OSS}			771		pF
Reverse Transfer Capacitance	C_{RSS}			102		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{DS}=480V$, $V_{GS}=10V$, $I_D=38A$ (Note 1, 2)		198		nC
Gate to Source Charge	Q_{GS}			53		nC
Gate to Drain Charge	Q_{GD}			59		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=100V$, $V_{GS}=10V$, $I_D=38A$, $R_G=25\Omega$ (Note 1, 2)		128		ns
Rise Time	t_R			41		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			461		ns
Fall-Time	t_F			90		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				38	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=38A$, $V_{GS}=0V$			1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_S=30A$, $V_{GS}=0V$, $dI_F/dt=100A/\mu s$		656		ns
Reverse Recovery Charge	Q_{rr}	(Note 1)		1.38		μC

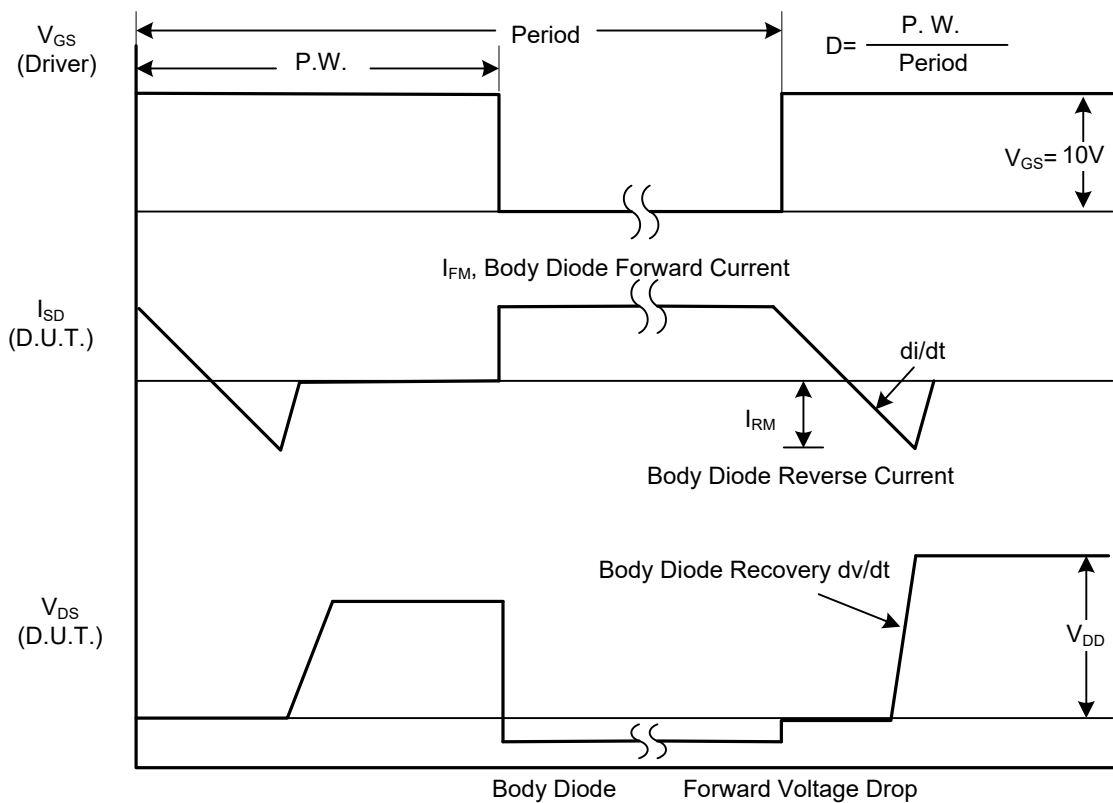
Notes: 1. Pulse Test: Pulse width $\leq 600\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

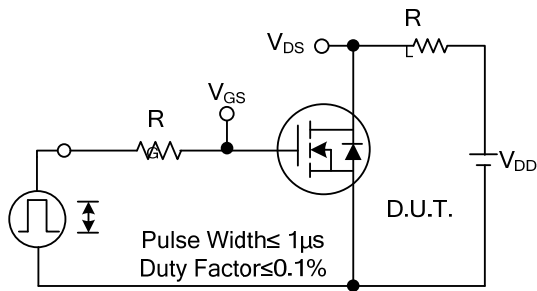


Peak Diode Recovery dv/dt Test Circuit

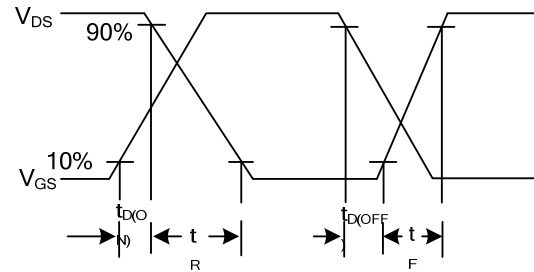


Peak Diode Recovery dv/dt Waveforms

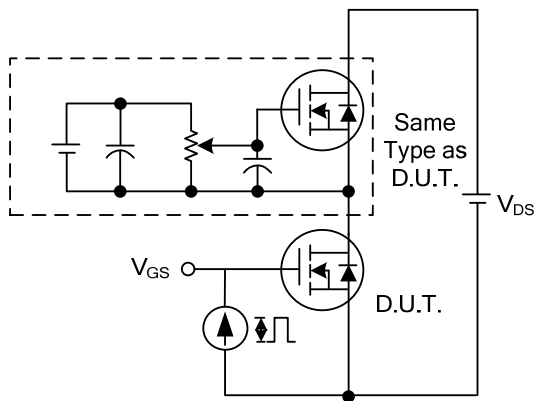
TEST CIRCUITS AND WAVEFORMS



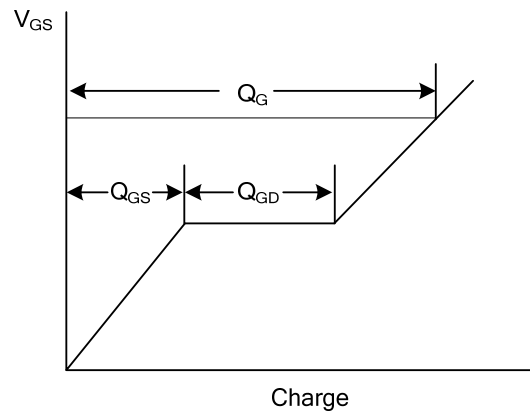
Switching Test Circuit



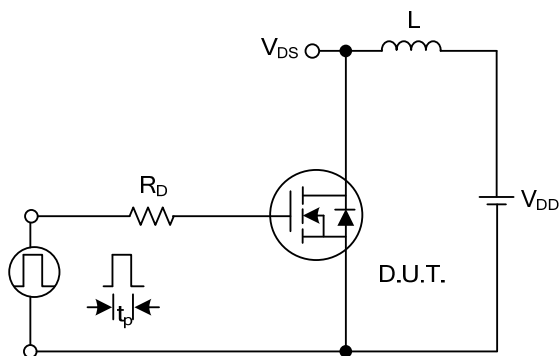
Switching Waveforms



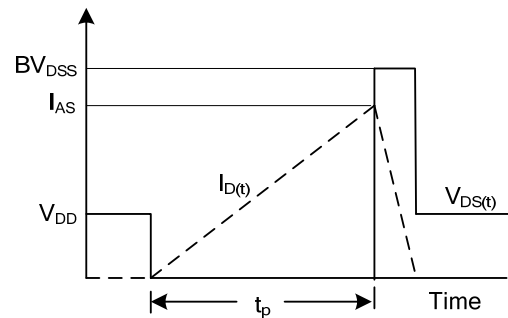
Gate Charge Test Circuit



Gate Charge Waveform

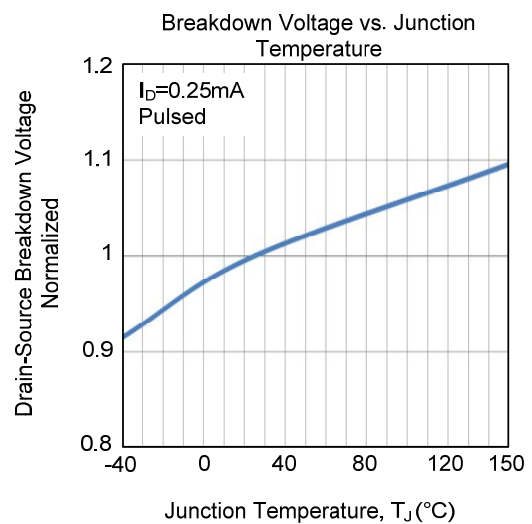
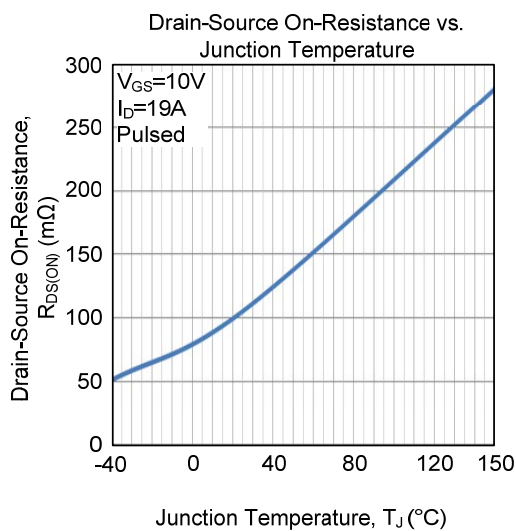
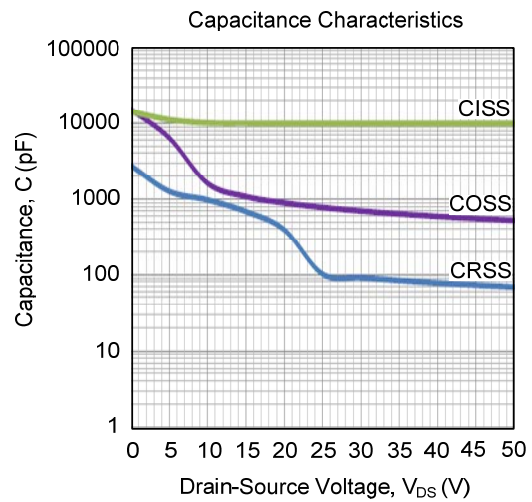
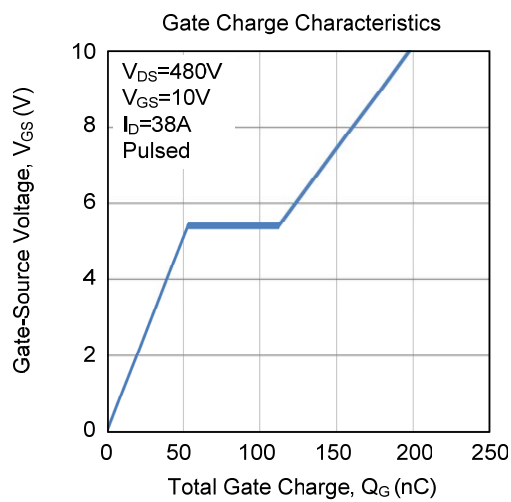
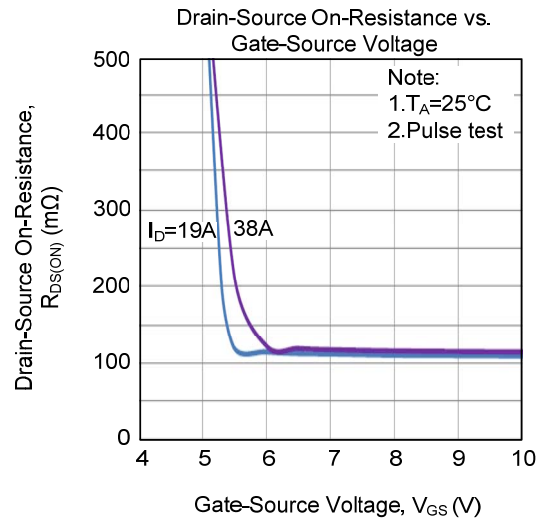
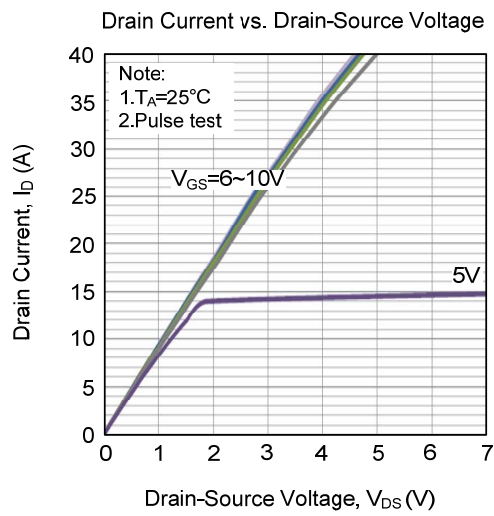


Unclamped Inductive Switching Test Circuit

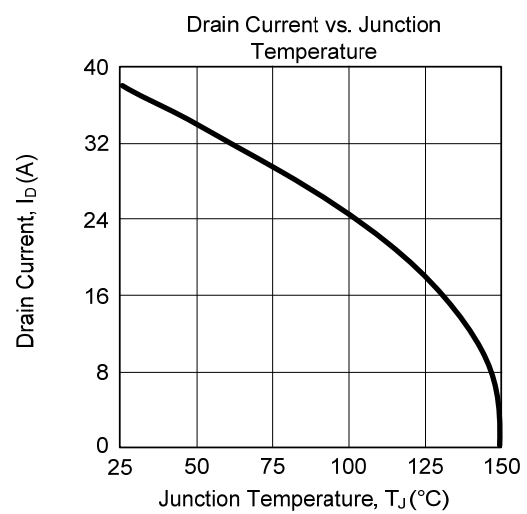
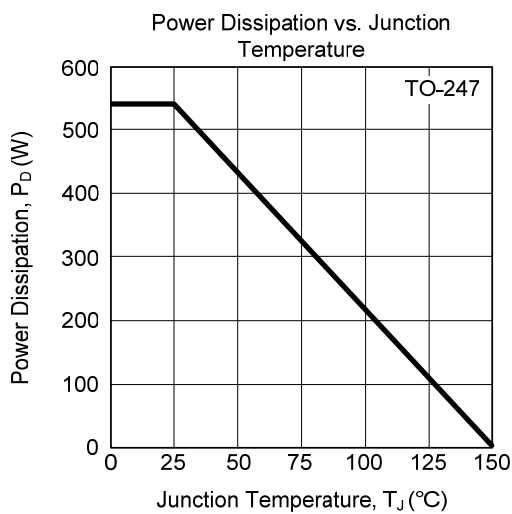
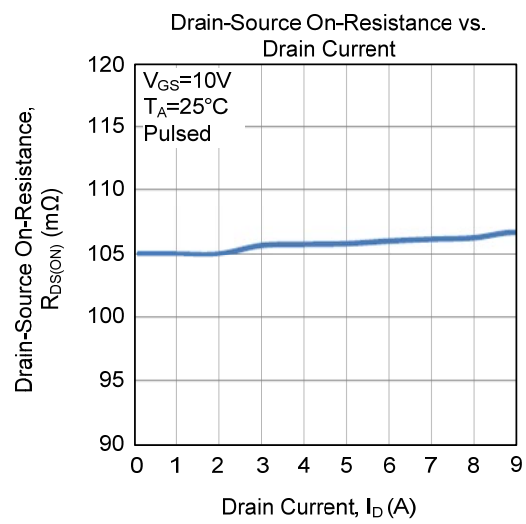
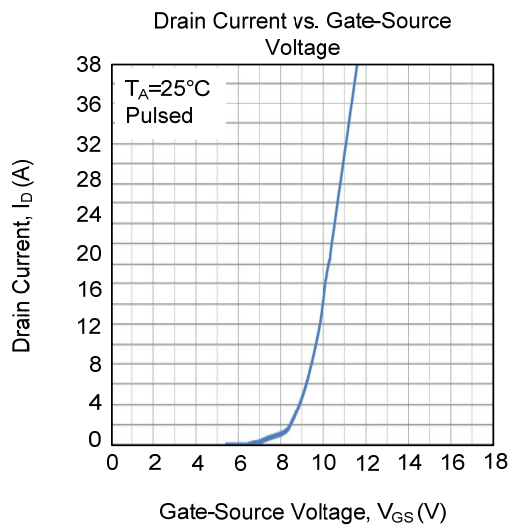
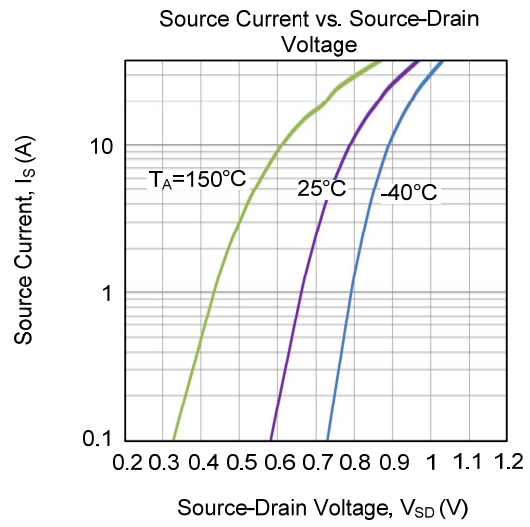
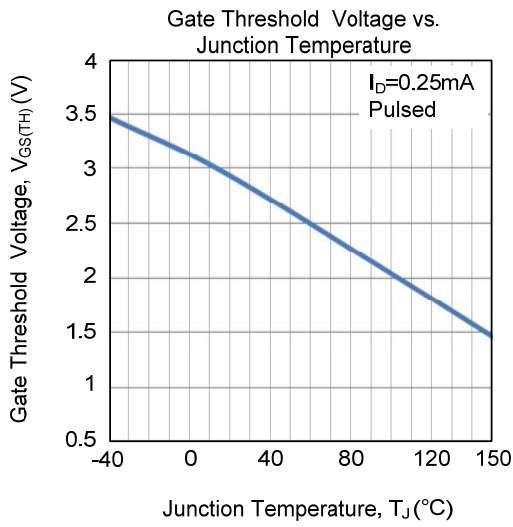


Unclamped Inductive Switching Waveforms

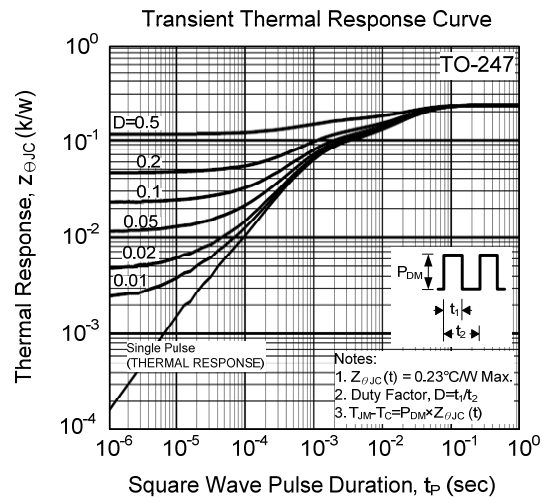
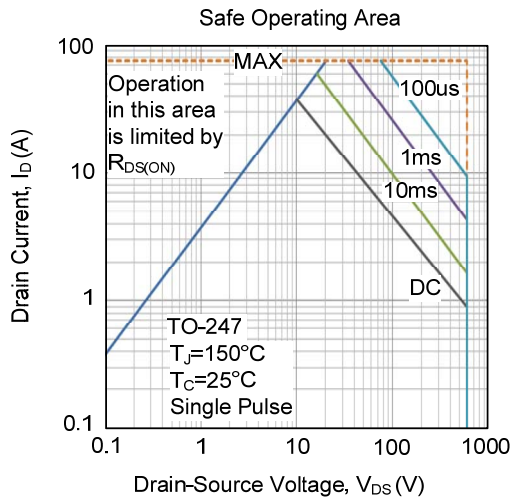
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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