



USG12R023HC

Preliminary

Power MOSFET

150A, 120V N-CHANNEL SGT ENHANCEMENT POWER MOSFET

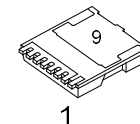
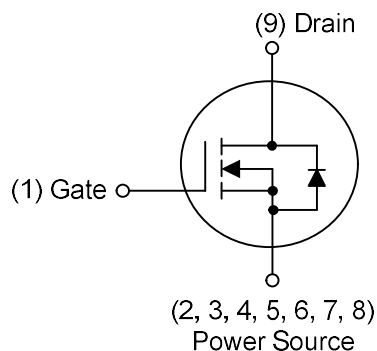
DESCRIPTION

The UTC **USG12R023HC** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with low $R_{DS(ON)}$ characteristic by high cell density trench technology.

FEATURES

- * $R_{DS(ON)} \leq 2.3 \text{ m}\Omega$ @ $V_{GS} = 10\text{V}$, $I_D = 20\text{A}$
- * Extremely low on-resistance $R_{DS(ON)}$
- * Excellent Low Ciss
- * Green Product

SYMBOL



TOLL-8A

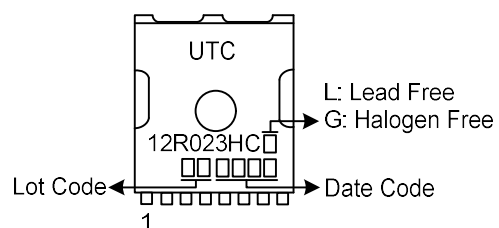
ORDERING INFORMATION

Ordering Number	Package	Pin Assignment									Packing
		1	2	3	4	5	6	7	8	9	
USG12R023HCG-T8A-R	TOLL-8A	G	S	S	S	S	S	S	S	D	Tape Reel

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

USG12R023HCG-T8A-R	(1)Packing Type	(1) R: Tape Reel
	(2)Package Type	(2) T8A: TOLL-8A
	(3)Green Package	(3) G: Halogen Free and Lead Free

■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	120	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current	DC	I_D	150	A
	Pulsed (Note 2)	I_{DM}	300	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	186	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	5.4	V/ns
Power Dissipation		P_D	400	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature Range		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. $L = 0.1\text{mH}$, $I_{AS} = 61\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 30\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	35	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	0.31	$^\circ\text{C}/\text{W}$

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

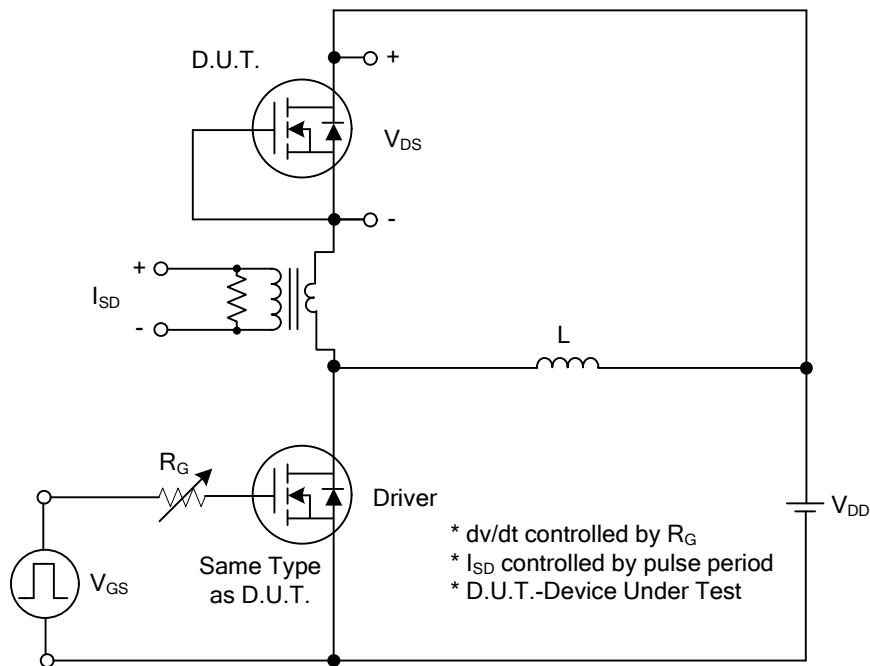
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	120			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =120V, V _{GS} =0V			1	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =+20V, V _{DS} =0V			+100	nA
	Reverse		V _{GS} =-20V, 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 =20A			2.3	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		1.5		nF
Output Capacitance		C _{OSS}			4260		pF
Reverse Transfer Capacitance		C _{RSS}			879		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =96V, V _{GS} =10V, I _D =150A (Note 1, 2)		248		nC
Gate to Source Charge		Q _{GS}			33		nC
Gate to Drain Charge		Q _{GD}			77		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =60V, V _{GS} =10V, I _D =150A, R _G =3Ω (Note 1, 2)		38		ns
Rise Time		t _R			46		ns
Turn-OFF Delay Time		t _{D(OFF)}			156		ns
Fall-Time		t _F			60		ns
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				150	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				300	A
Diode Forward Voltage		V _{SD}	I _F =150A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =30A, V _{GS} =0V,		133		nS
Reverse Recovery Charge		Q _{rr}	dI _F /dt =100A/μs		477		nC

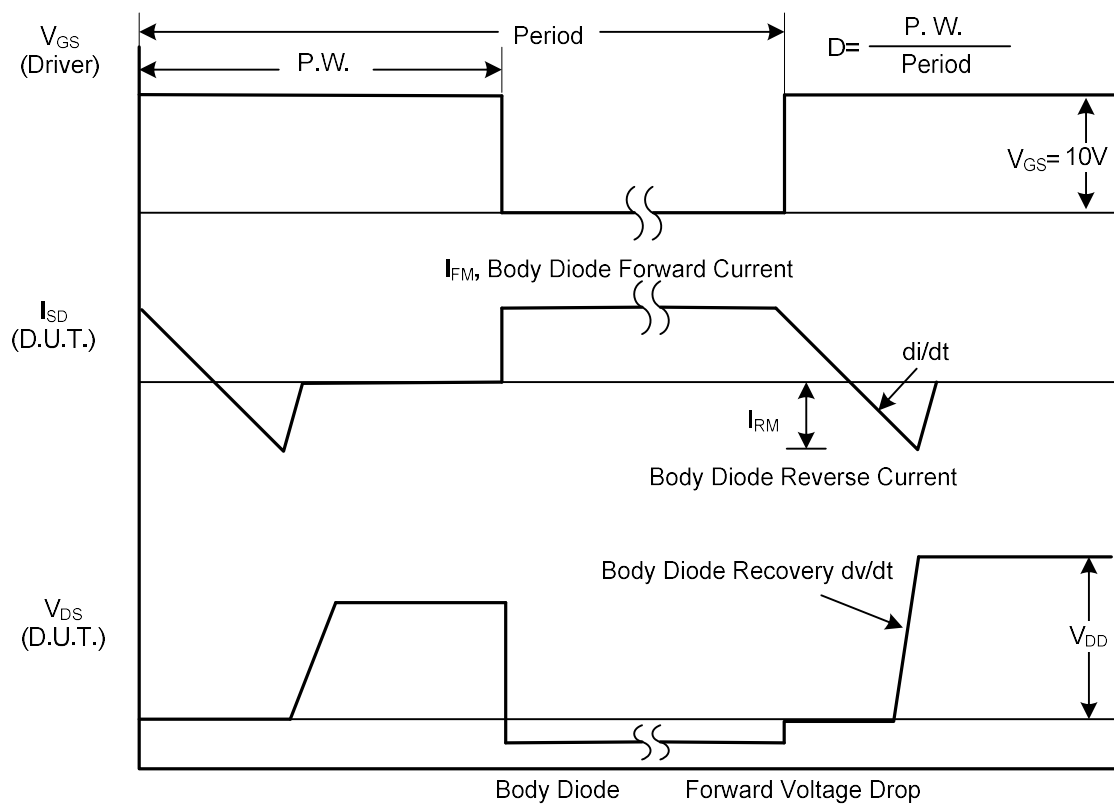
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

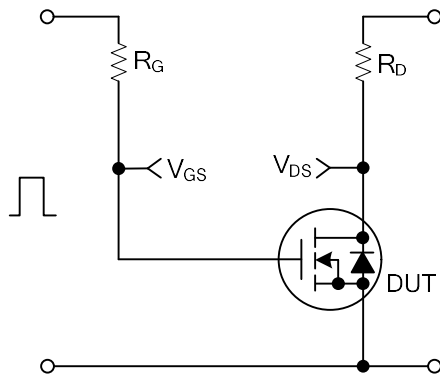


Peak Diode Recovery dv/dt Test Circuit

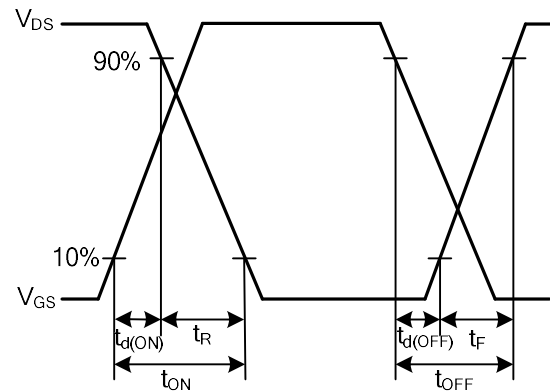


Peak Diode Recovery dv/dt Waveforms

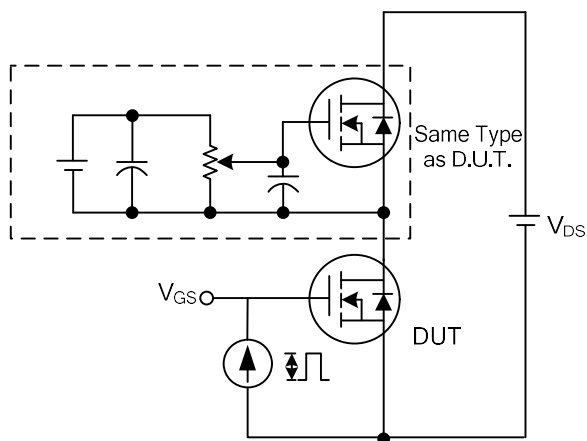
■ TEST CIRCUITS AND WAVEFORMS



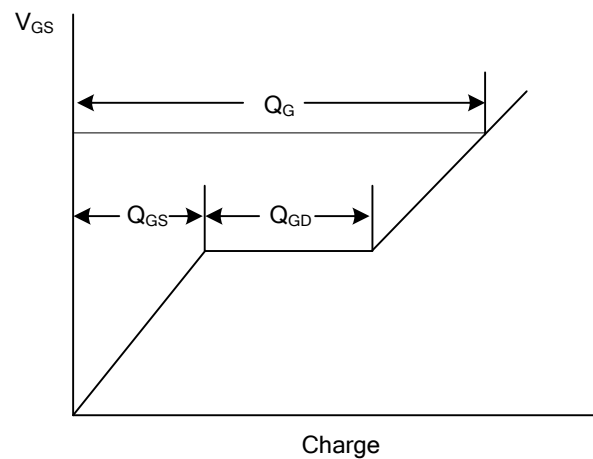
Switching Test Circuit



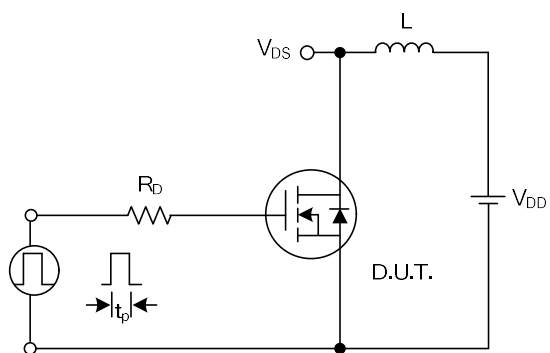
Switching Waveforms



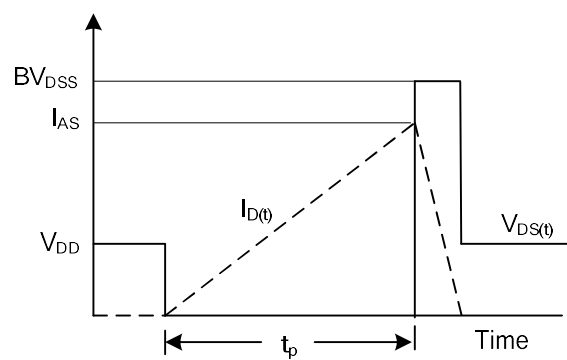
Gate Charge Test Circuit



Gate Charge Waveform

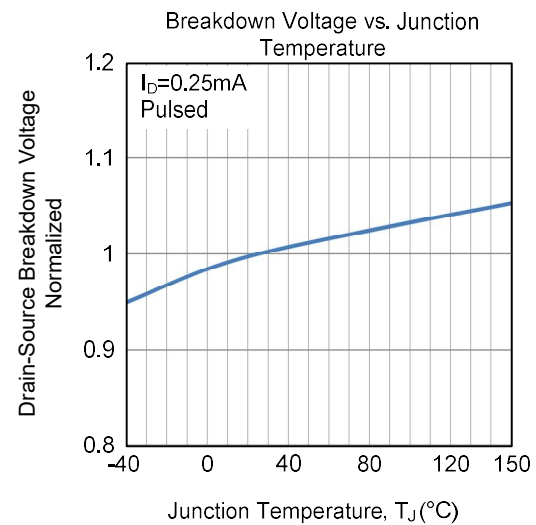
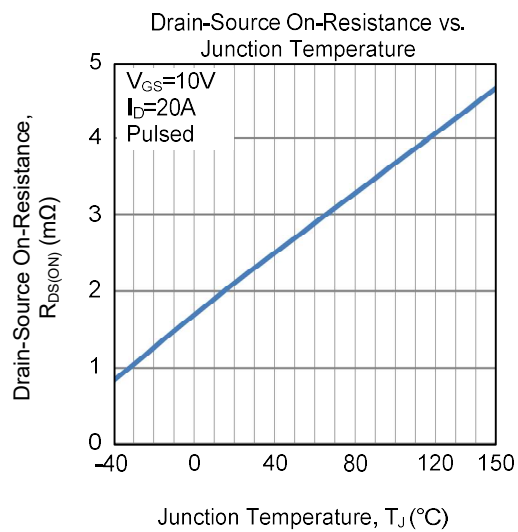
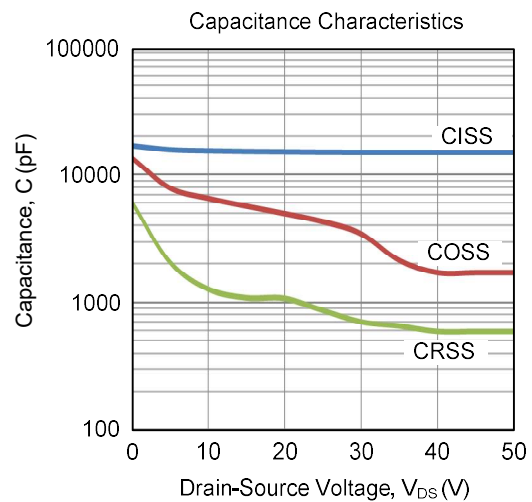
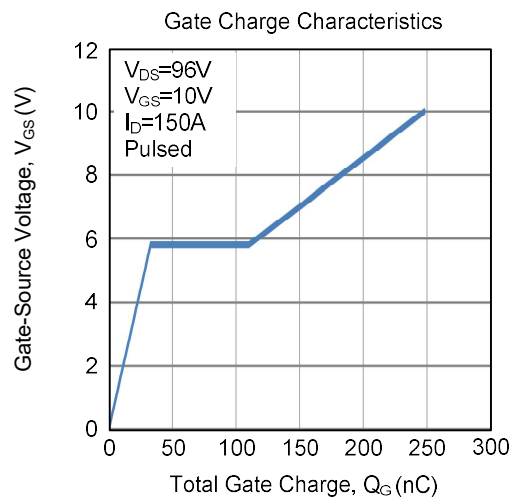
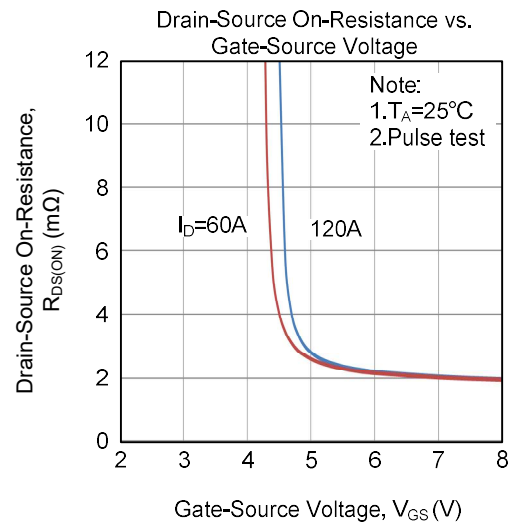
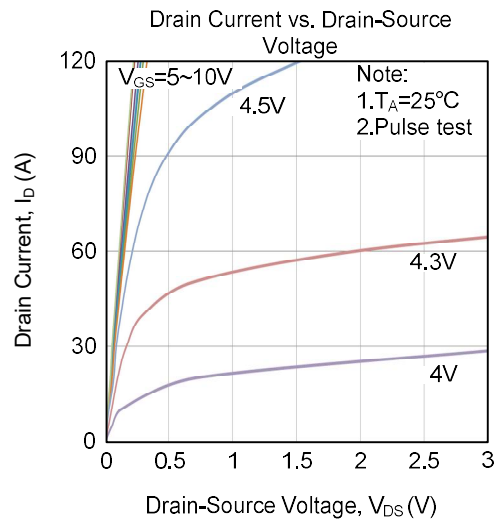


Unclamped Inductive Switching Test Circuit

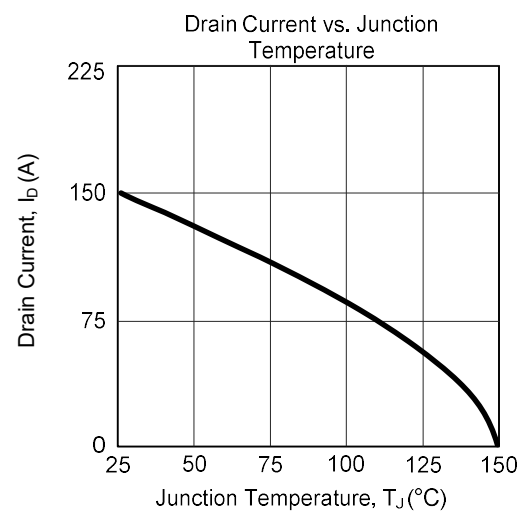
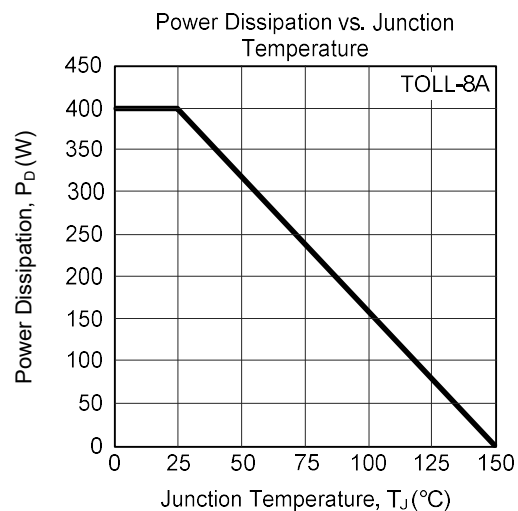
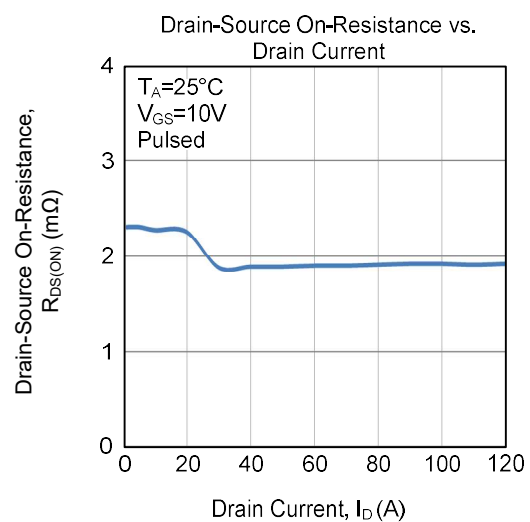
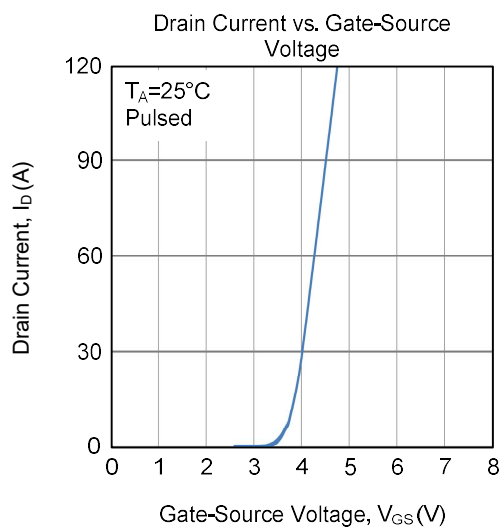
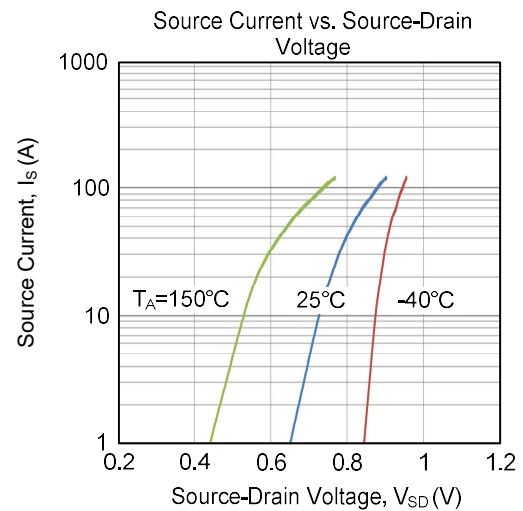
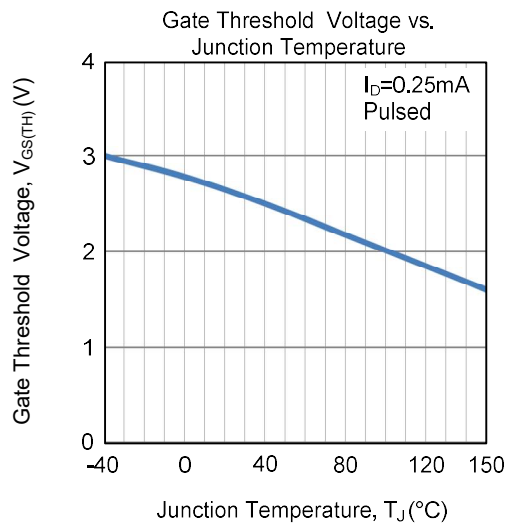


Unclamped Inductive Switching Waveforms

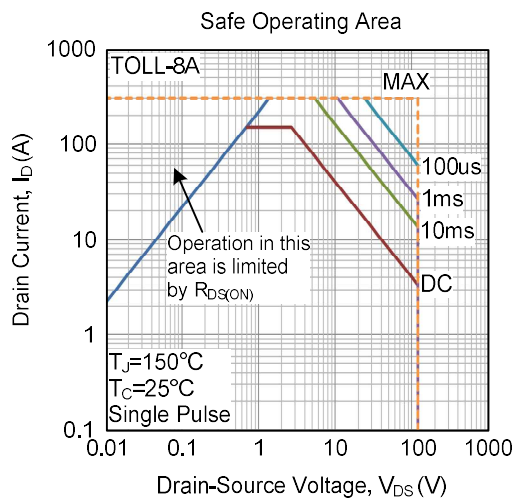
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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