



24N50-HCQ

Power MOSFET

24A, 500V N-CHANNEL POWER MOSFET

DESCRIPTION

The UTC **24N50-HC** is a N-channel enhancement MOSFET using UTC's advanced technology to provide the customers with perfect $R_{DS(ON)}$, high switching speed, high current capacity and low gate charge.

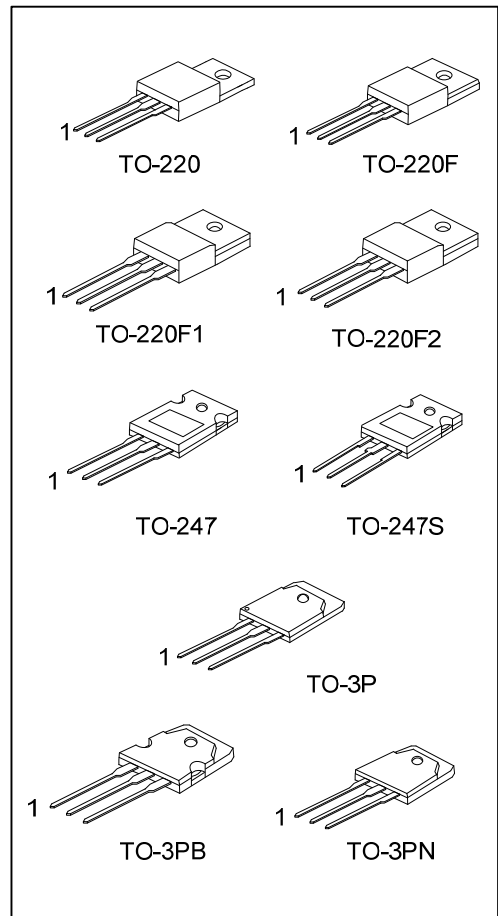
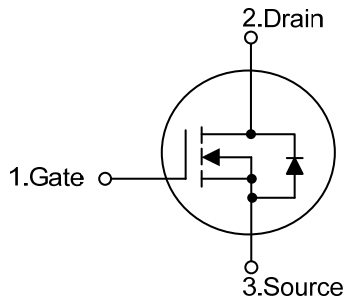
The UTC **24N50-HC** is universally applied in low voltage such as automotive, high efficiency switching for AC/DC converters and DC motor control, etc.

FEATURES

* $R_{DS(ON)} \leq 0.26 \Omega$ @ $V_{GS}=10V$, $I_D=12A$

* High Switching Speed

SYMBOL



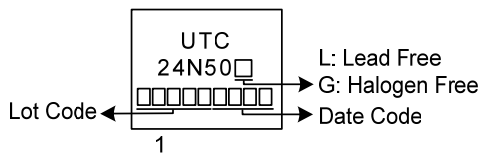
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
24N50L-TA3-T	24N50G-TA3-T	TO-220	G	D	S	Tube
24N50L-TF1-T	24N50G-TF1-T	TO-220F1	G	D	S	Tube
24N50L-TF2-T	24N50G-TF2-T	TO-220F2	G	D	S	Tube
24N50L-TF3-T	24N50G-TF3-T	TO-220F	G	D	S	Tube
24N50L-T3P-T	24N50G-T3P-T	TO-3P	G	D	S	Tube
24N50L-T3B-T	24N50G-T3B-T	TO-3PB	G	D	S	Tube
24N50L-T3N-T	24N50G-T3N-T	TO-3PN	G	D	S	Tube
24N50L-T47-T	24N50G-T47-T	TO-247	G	D	S	Tube
24N50L-T47S-T	24N50G-T47S-T	TO-247S	G	D	S	Tube

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

<p>24N50G-TA3-T</p>	<p>(1) T: Tube (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F, T3P: TO-3P, T3B: TO-3PB, T3N: TO-3PN, T47: TO-247, T47S: TO-247S (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_c=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DSS}	500	V
Gate-Source Voltage		V _{GSS}	±30	V
Continuous Drain Current	Continuous	I _D	24	A
	Pulsed	I _{DM}	48	A
Single Pulsed Avalanche Energy		E _{AS}	1560	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.4	V/ns
Power Dissipation	TO-220	P _D	210	W
	TO-220F/TO-220F1 TO-220F2		44	W
	TO-247/TO-247S		240	W
	TO-3P/TO-3PB TO-3PN		250	W
Junction Temperature		T _J	+150	°C
Storage Temperature		T _{STG}	-55 ~ +150	°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=30mH, I_{AS}=10.2A, V_{DD}=50V, R_G=25Ω, Starting T_J = 25°C
 4. I_{SD} ≤ 24A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2	θ _{JA}	62.5	°C/W
	TO-247/TO-247S		50	°C/W
	TO-3P/TO-3PB TO-3PN		40	°C/W
Junction to Case	TO-220	θ _{JC}	0.59	°C/W
	TO-220F/TO-220F1 TO-220F2		2.84	°C/W
	TO-247/TO-247S		0.52	°C/W
	TO-3P/TO-3PB TO-3PN		0.5	°C/W

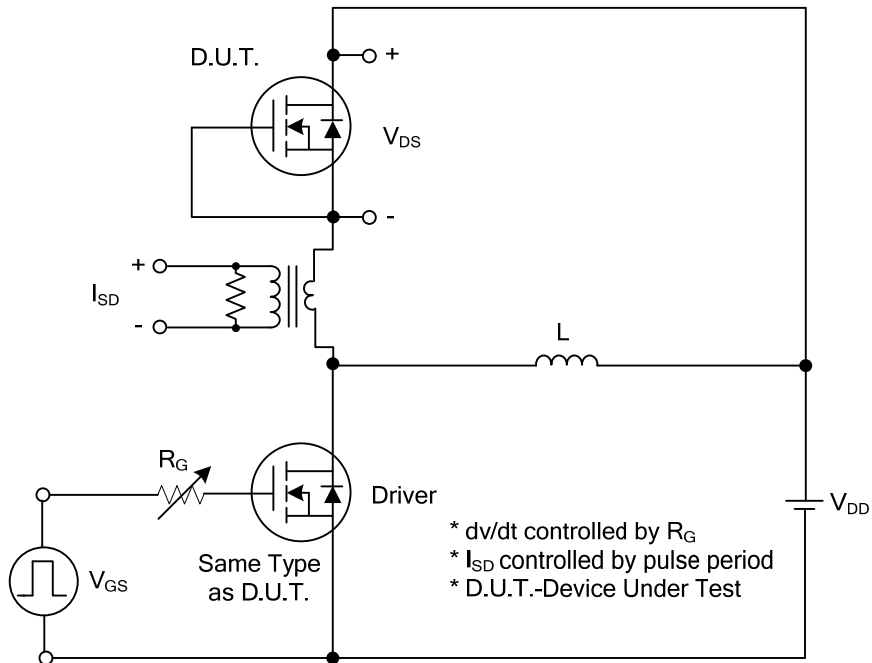
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	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
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 =12A			0.26	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		3240		pF
Output Capacitance	C _{OSS}			355		pF
Reverse Transfer Capacitance	C _{RSS}			31		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{DS} =400V, V _{GS} =10V, I _D =24A I _G =1mA (Note 1, 2)		100		nC
Gate to Source Charge	Q _{GS}			25		nC
Gate to Drain Charge	Q _{GD}			40		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =24A, R _G =25Ω (Note 1, 2)		48		ns
Rise Time	t _R			36		ns
Turn-OFF Delay Time	t _{D(OFF)}			240		ns
Fall-Time	t _F			58		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				24	A
Maximum Body-Diode Pulsed Current	I _{SM}				48	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S =24A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _S =24A, V _{GS} =0V, di _F /dt=100A/μs (Note 1)		460		ns
Reverse Recovery Charge	Q _{rr}				7.6	

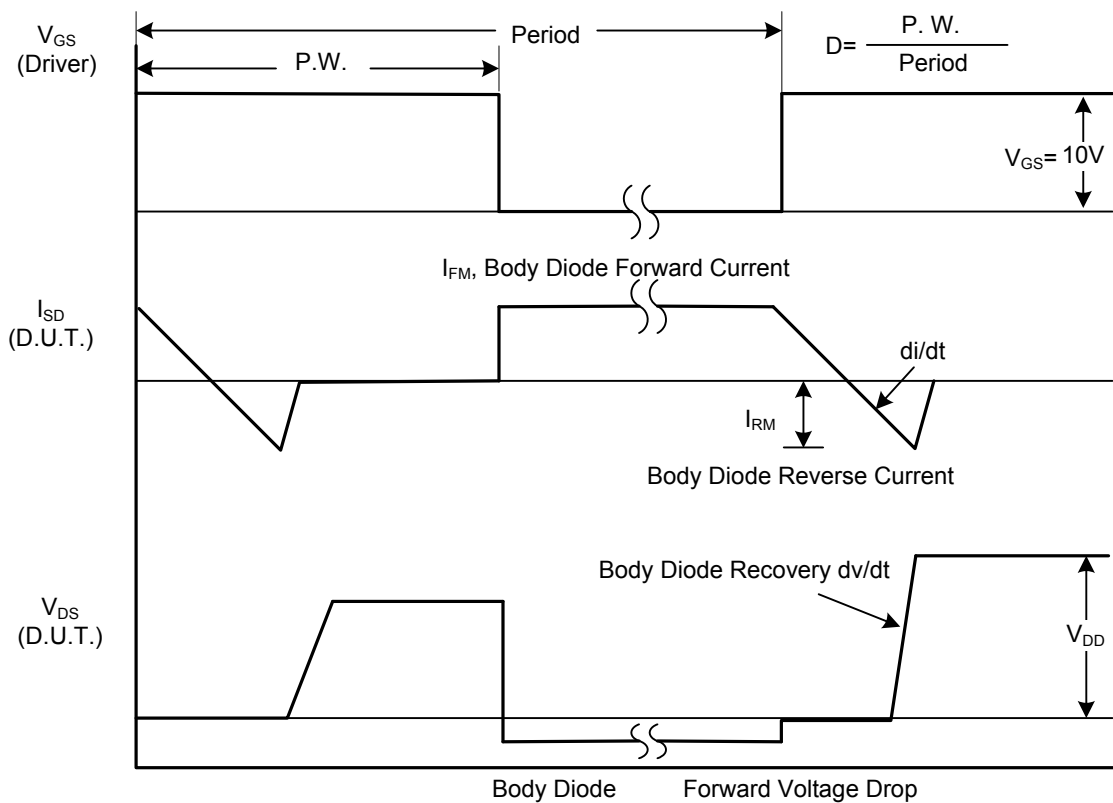
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

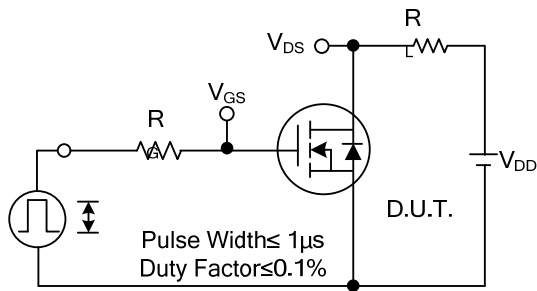


Peak Diode Recovery dv/dt Test Circuit

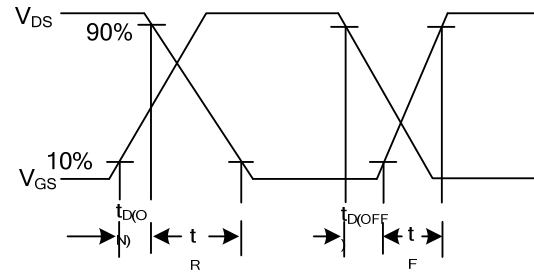


Peak Diode Recovery dv/dt Waveforms

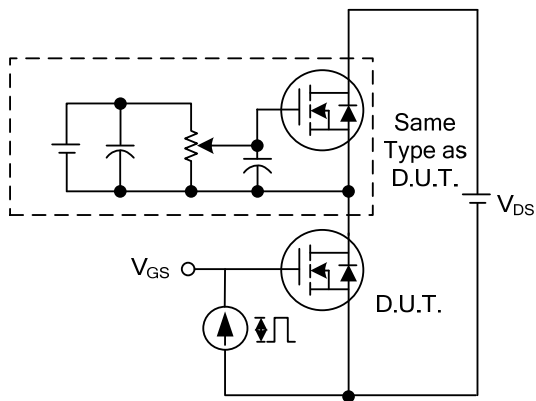
TEST CIRCUITS AND WAVEFORMS



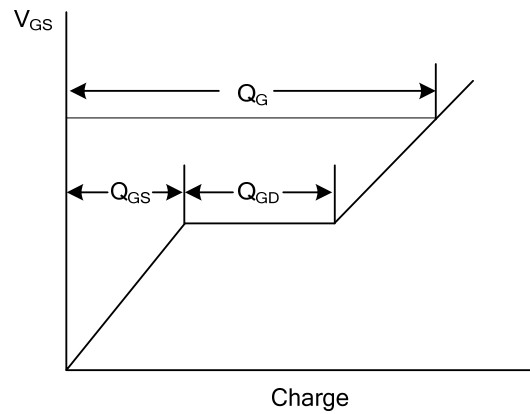
Switching Test Circuit



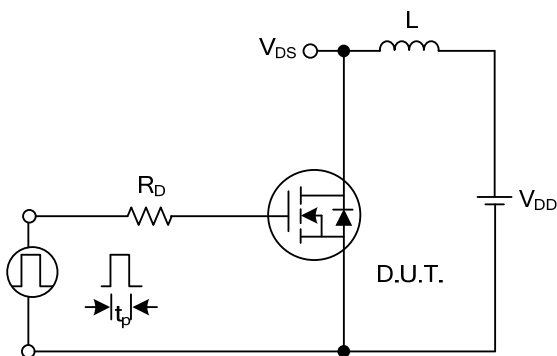
Switching Waveforms



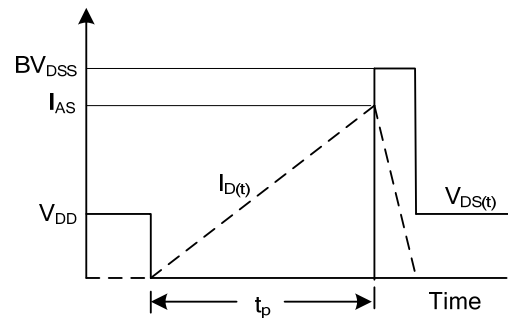
Gate Charge Test Circuit



Gate Charge Waveform

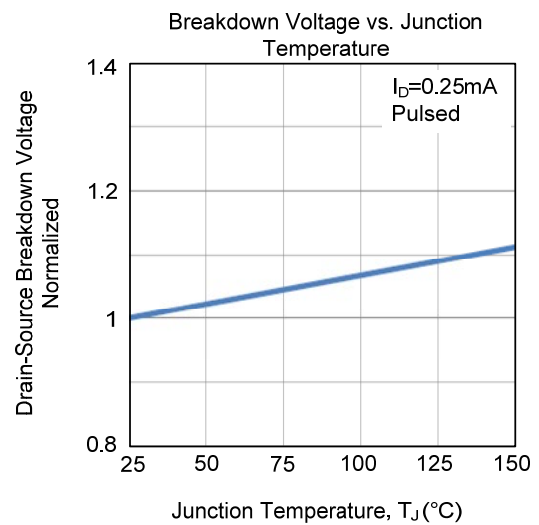
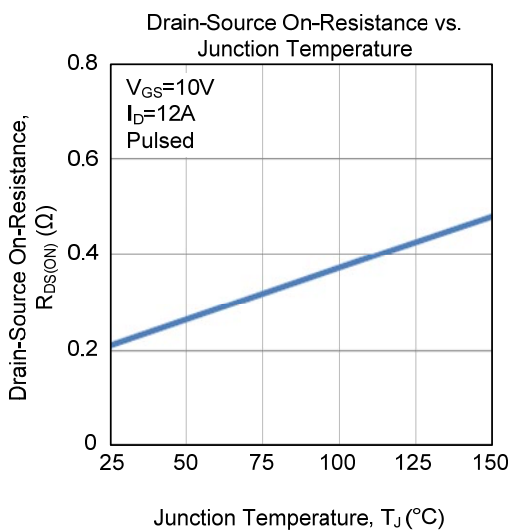
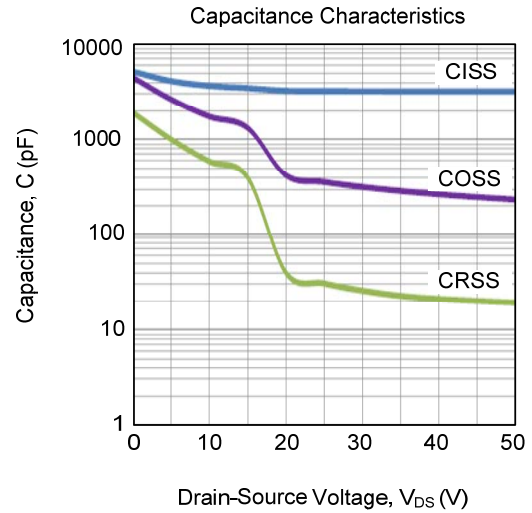
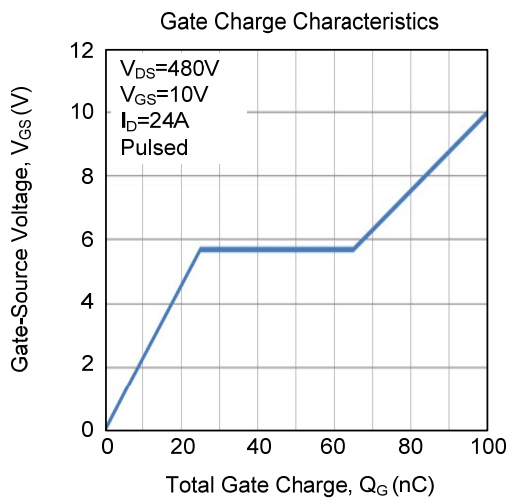
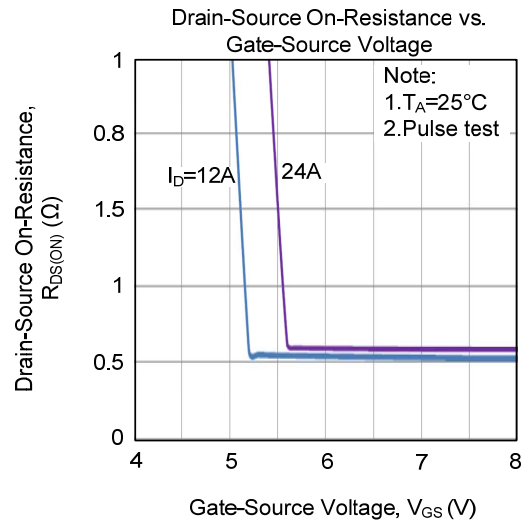
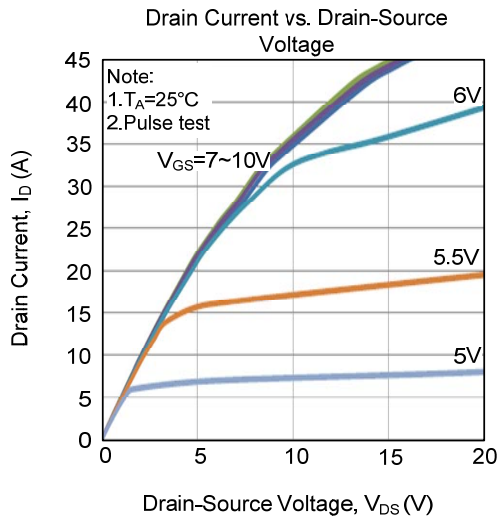


Unclamped Inductive Switching Test Circuit

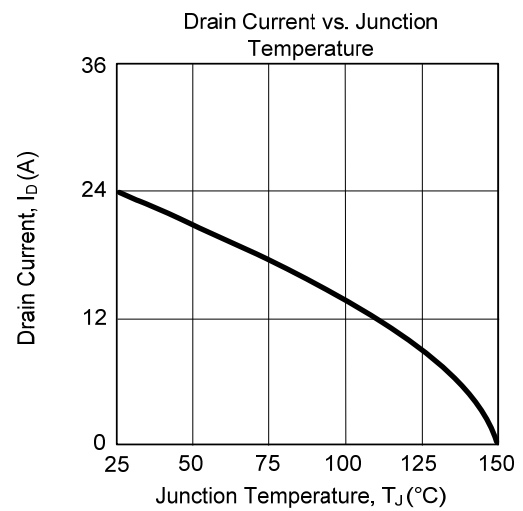
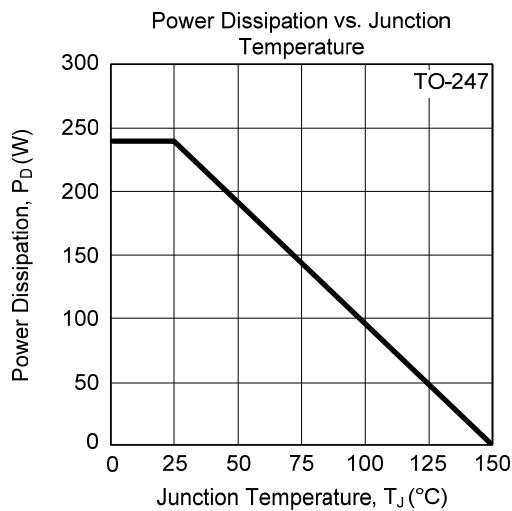
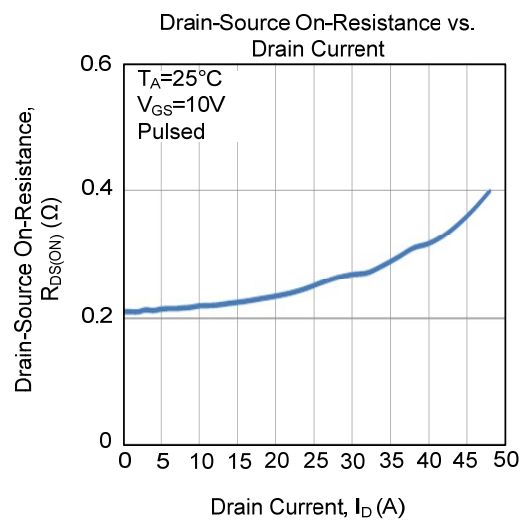
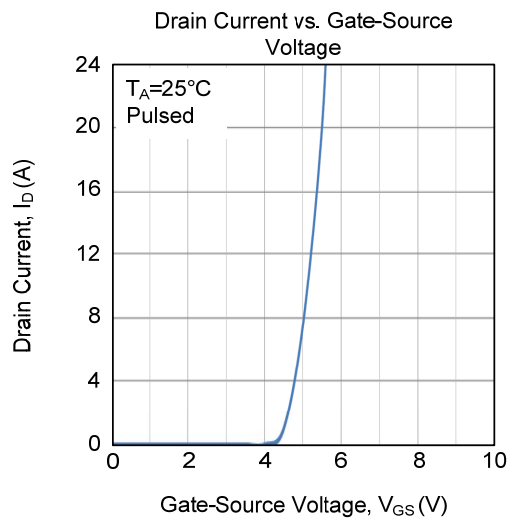
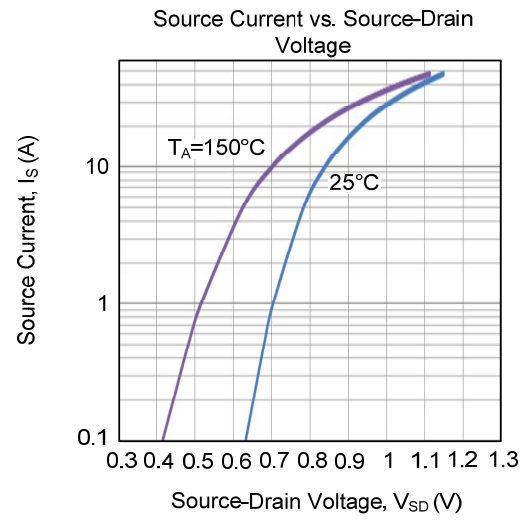
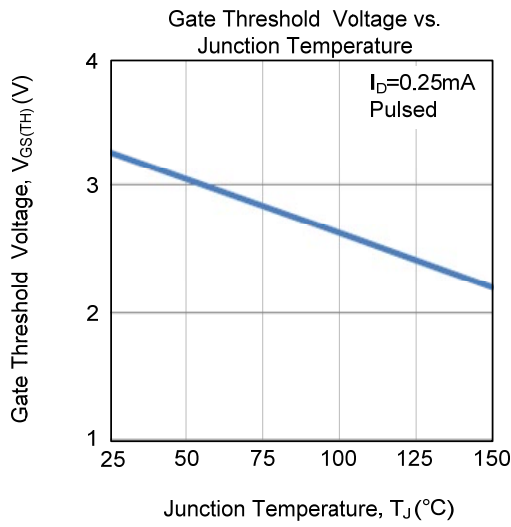


Unclamped Inductive Switching Waveforms

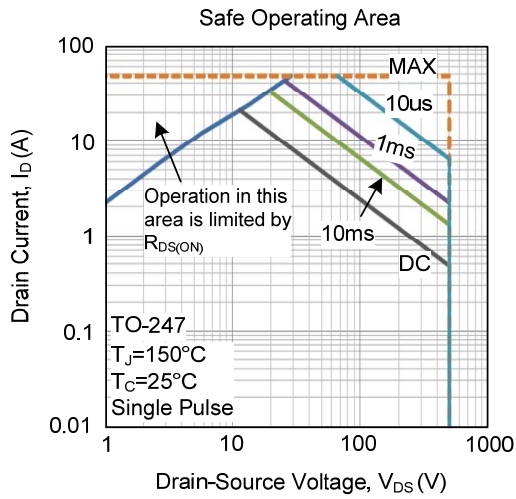
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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