



02NM65-FD

Power MOSFET

0.2A, 650V N-CHANNEL SUPER-JUNCTION MOSFET

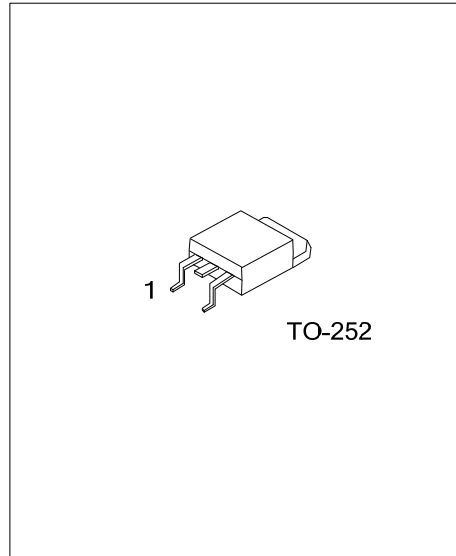
DESCRIPTION

The UTC **02NM65-FD** is an Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics.

This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

FEATURES

- * $R_{DS(on)} < 19\Omega @ V_{GS}=10V, I_D=0.1A$
- * High breakdown voltage



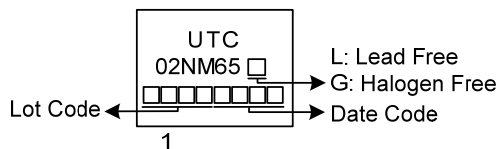
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
02NM65L-TN3-R	02NM65G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>02NM65G-TN3-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) TN3: TO-252</p> <p>(3) G: Halogen Free and Lead Free L: Lead Free</p>
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MARKING



■ ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, 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	0.2
	Pulsed	I_{DM}	0.4
Peak Diode Recovery dv/dt (Note 3)	dv/dt	8	V/ns
Power Dissipation	P_D	20	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. $I_{SD} \leq 0.2\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	110	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	6.25	$^\circ\text{C}/\text{W}$

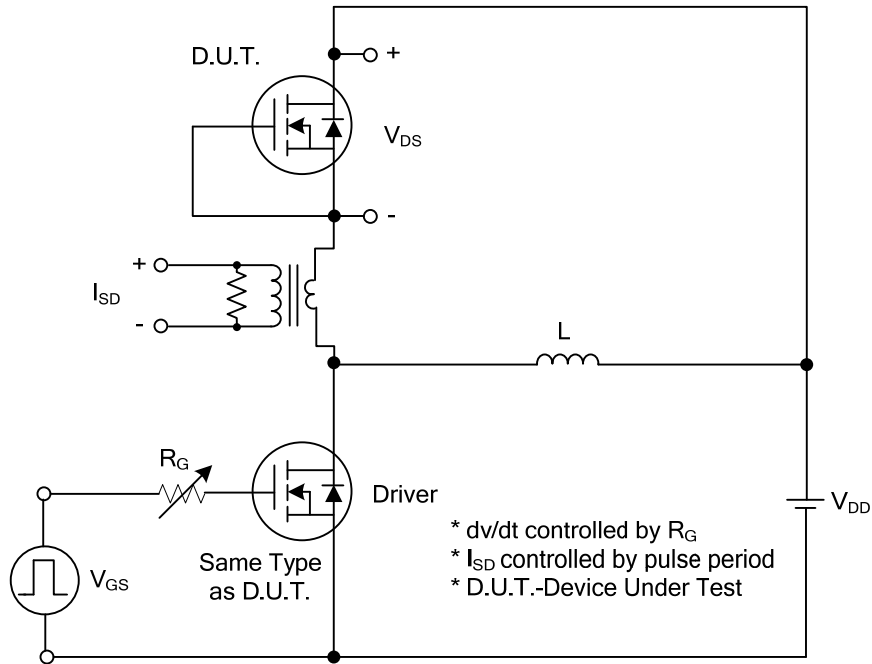
■ ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	650			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 650\text{V}$, $V_{GS} = 0\text{V}$			10	μA
Gate-Source Leakage Current	I_{GSS}	Forward			+100	nA
		Reverse	$V_{GS} = +30\text{V}$, $V_{DS} = 0\text{V}$			-100
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	1.0		3.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}$, $I_D = 0.1\text{A}$			19	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1.0\text{MHz}$		26		pF
Output Capacitance	C_{OSS}			20		pF
Reverse Transfer Capacitance	C_{RSS}			3		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{DS} = 150\text{V}$, $V_{GS} = 10\text{V}$, $I_D = 0.2\text{A}$, $I_D = 3\text{mA}$ (Note 1, 2)		6		nC
Gate to Source Charge	Q_{GS}			2.4		nC
Gate to Drain Charge	Q_{GD}			1.4		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DS} = 150\text{V}$, $V_{GS} = 10\text{V}$, $I_D = 0.2\text{A}$, $R_G = 25\Omega$ (Note 1, 2)		3		ns
Rise Time	t_R			6.2		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			24		ns
Fall-Time	t_F			276		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				0.2	A
Maximum Body-Diode Pulsed Current	I_{SM}				0.4	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_S = 0.2\text{A}$, $V_{GS} = 0\text{V}$			1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_S = 0.2\text{A}$, $V_{GS} = 0\text{V}$,		66		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$di_F/dt = 100\text{A}/\mu\text{s}$ (Note 1)		0.07		μC

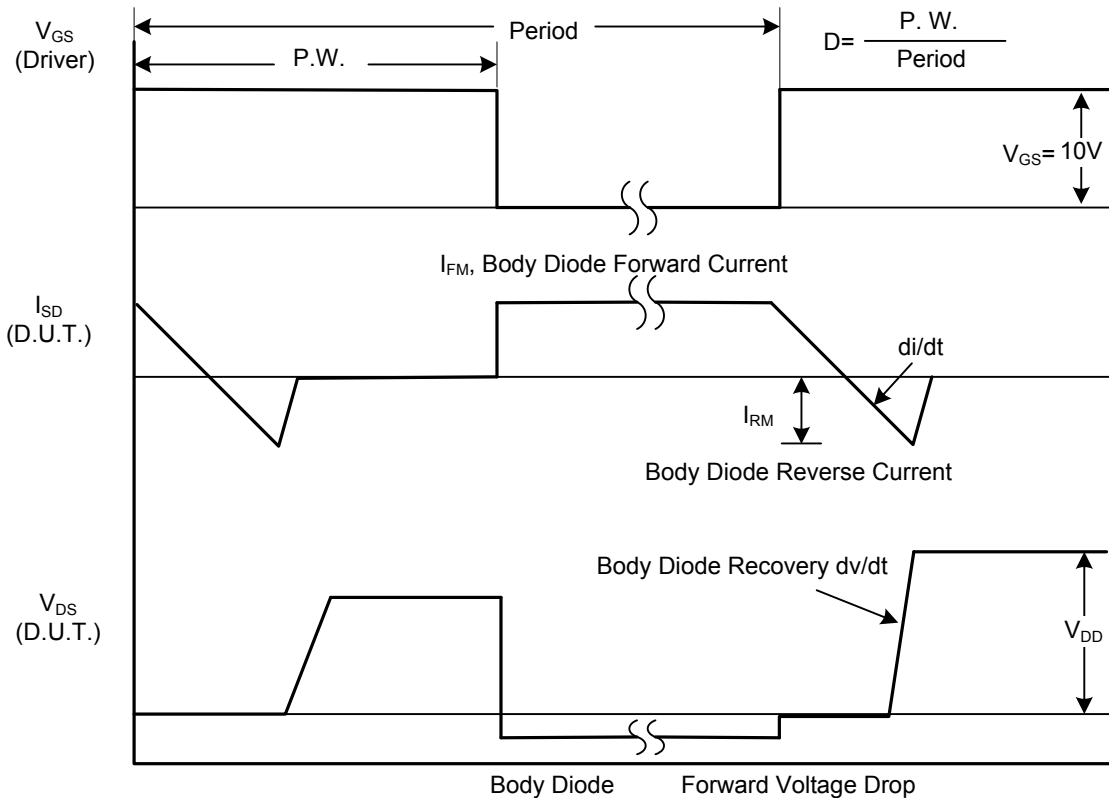
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

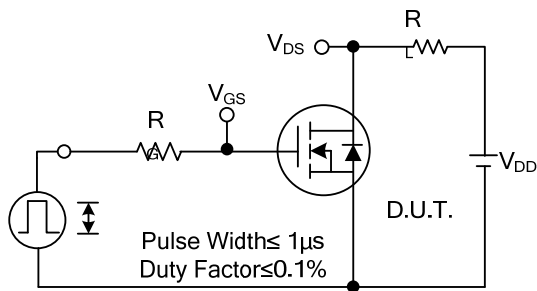


Peak Diode Recovery dv/dt Test Circuit

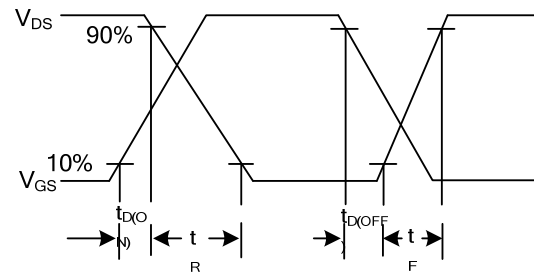


Peak Diode Recovery dv/dt Waveforms

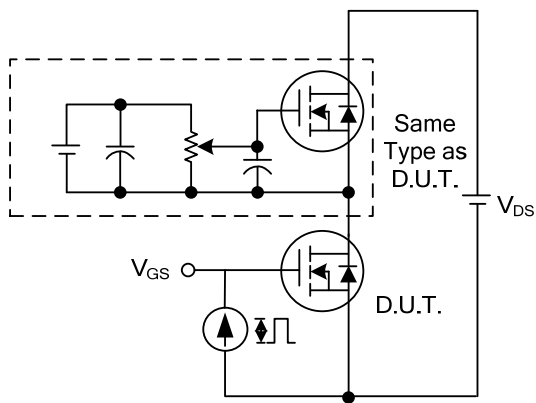
TEST CIRCUITS AND WAVEFORMS



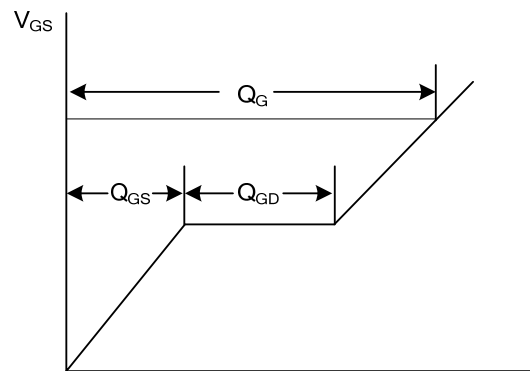
Switching Test Circuit



Switching Waveforms

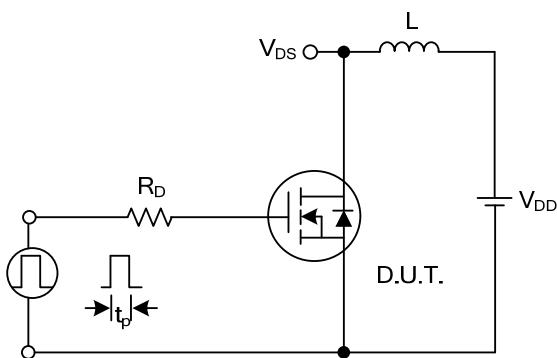


Gate Charge Test Circuit

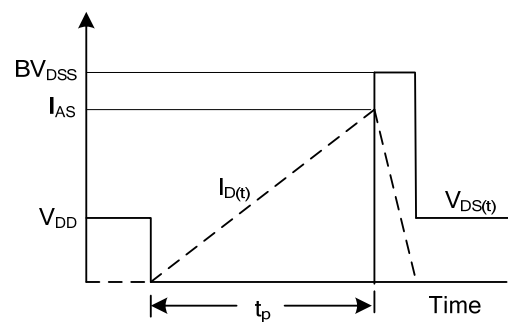


Charge

Gate Charge Waveform

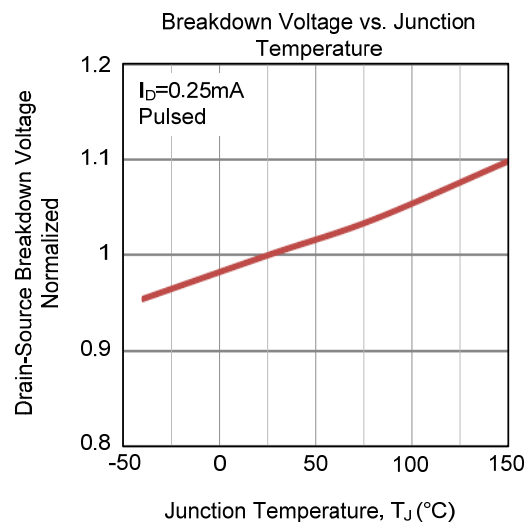
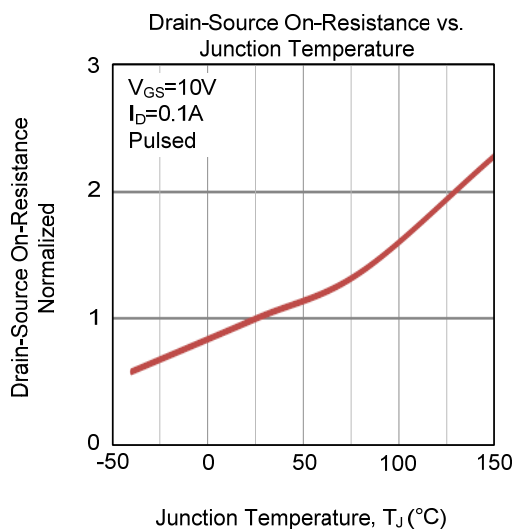
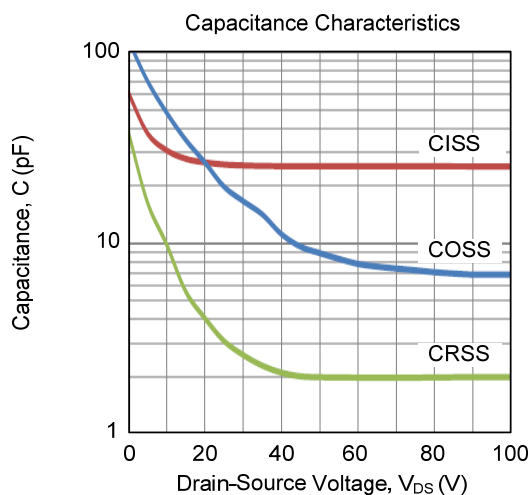
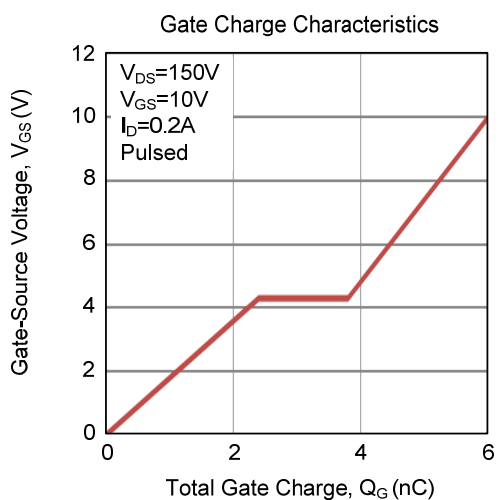
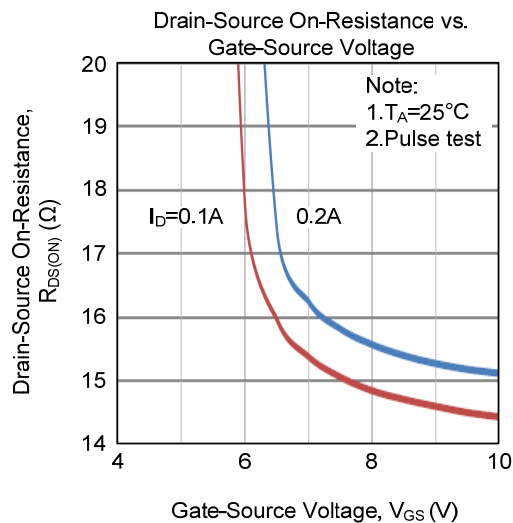
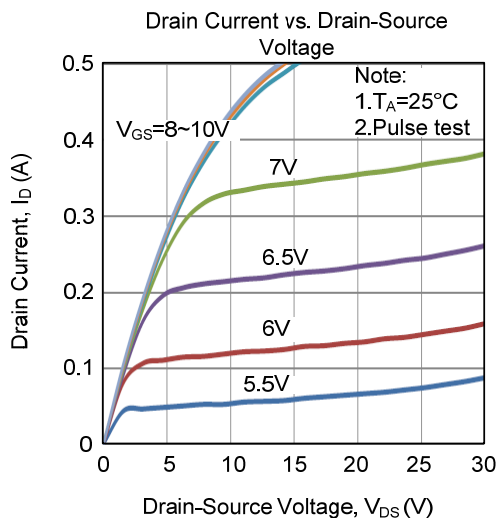


Unclamped Inductive Switching Test Circuit

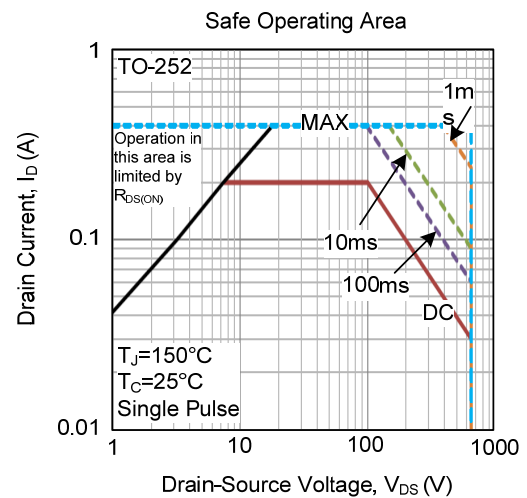
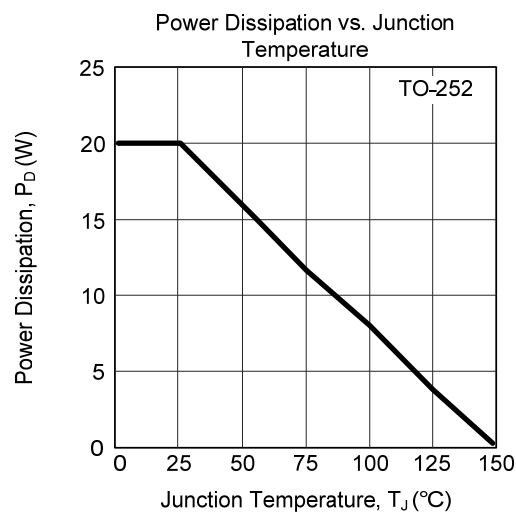
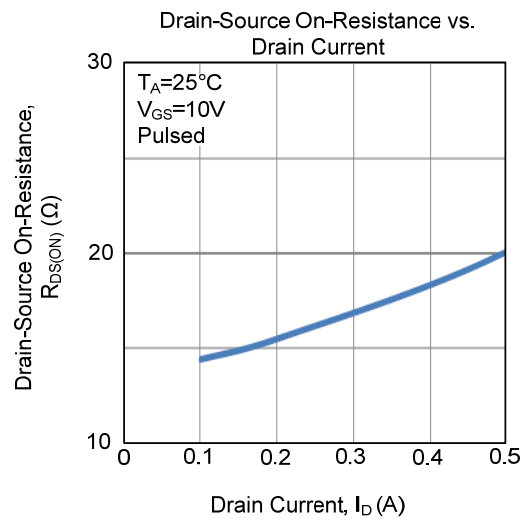
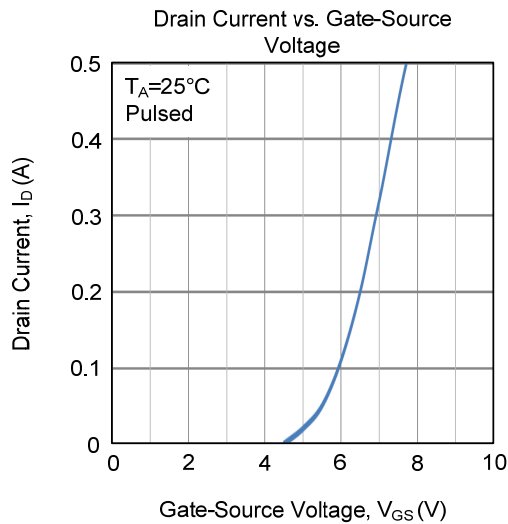
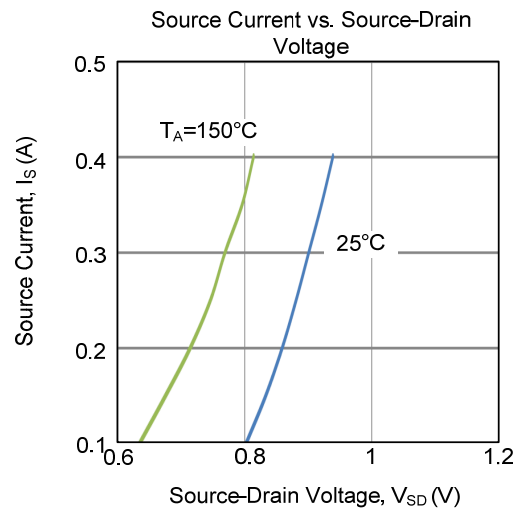
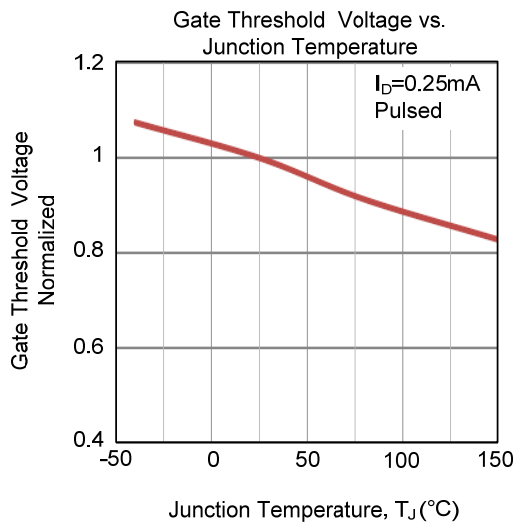


Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (Cont.)



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