



3NK120Z

POWER MOSFET

3.0A, 1200V N-CHANNEL POWER MOSFET

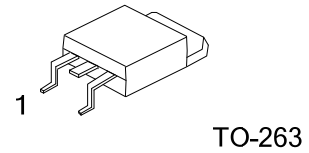
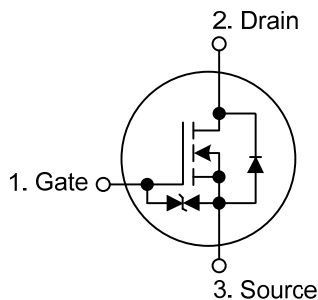
DESCRIPTION

The UTC **3NK120Z** is a silicon N-channel MOSFET, it uses UTC's advanced technology to provide the customers with a minimum on state resistance, high switching speed and low gate charge.

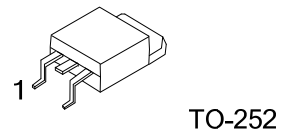
FEATURES

- * $R_{DS(ON)} \leq 6.0 \Omega$ @ $V_{GS}=10V$, $I_D=1.5A$
- * High switching speed
- * Low input capacitance
- * With ESD protection

SYMBOL



TO-263



TO-252

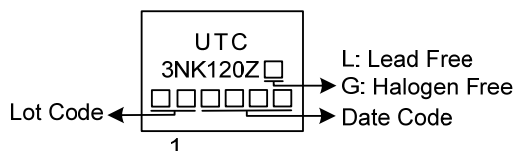
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
3NK120ZL-TN3-R	3NK120ZG-TN3-R	TO-252	G	D	S	Tape Reel
3NK120ZL-TQ2-T	3NK120ZG-TQ2-T	TO-263	G	D	S	Tube
3NK120ZL-TQ2-R	3NK120ZG-TQ2-R	TO-263	G	D	S	Tape Reel

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

3NK120ZG-TN3-R	(1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel, T: Tube (2) TN3: TO-252, TQ2: TO-263 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING



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

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V _{DSS}	1200	V
Gate-Source Voltage			V _{GSS}	±20	V
Drain Current	DC		I _D	3	A
	Pulsed (Note 2)		I _{DM}	9	A
Avalanche Energy	Single Pulsed (Note 3)		E _{AS}	136	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	1.52	V/ns
Power Dissipation	TO-252	Steady State	P _D	45	W
		t ≤ 0.1s		100	W
	TO-263	Steady State		70	W
		t ≤ 0.1s		178	W
Junction Temperature			T _J	+150	°C
Storage Temperature Range			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. $L = 100\text{mH}$, $I_{AS} = 1.6\text{ A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$.

4. $I_{SD} \leq 3.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^{\circ}\text{C}$.

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252	θ_{JA}	110	$^{\circ}\text{C}/\text{W}$
	TO-263		62.5	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-252	Steady State	2.77 (Note)	$^{\circ}\text{C}/\text{W}$
		$t \leq 0.1\text{s}$	1.25 (Note)	$^{\circ}\text{C}/\text{W}$
	TO-263	Steady State	1.78 (Note)	$^{\circ}\text{C}/\text{W}$
		$t \leq 0.1\text{s}$	0.7 (Note)	$^{\circ}\text{C}/\text{W}$

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

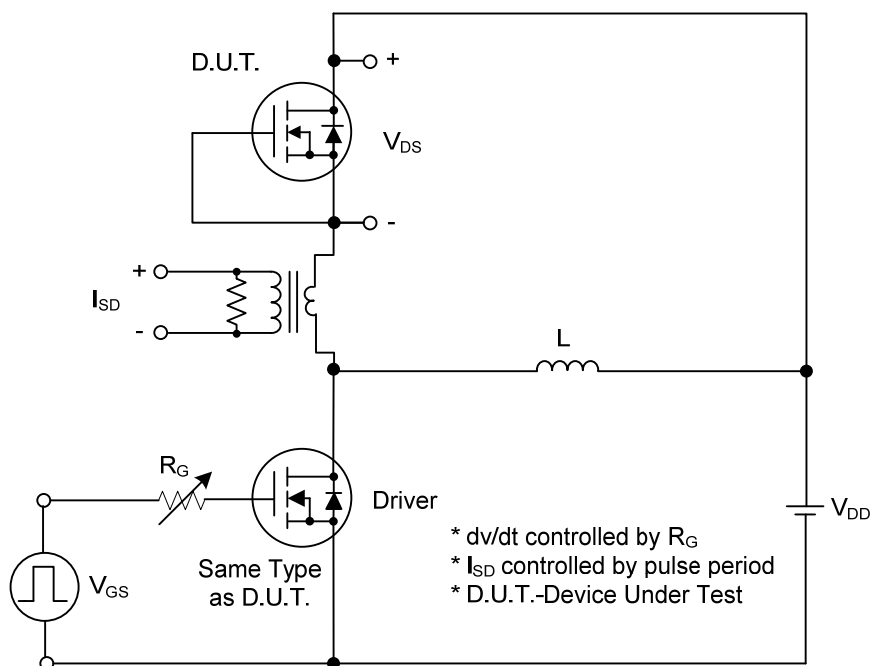
■ **ELECTRICAL CHARACTERISTICS** ($T_A=25^\circ\text{C}$ unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	1200			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =1200V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =+20V, V _{DS} =0V			+10	μA
	Reverse		V _{GS} =-20V, V _{DS} =0V			-10	μA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	3.0		5.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =1.5A		5.5	6.0	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		898		pF
Output Capacitance		C _{OSS}			60		pF
Reverse Transfer Capacitance		C _{RSS}			5		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =960V, V _{GS} =10V, I _D =3.0A (Note 1, 2)		23		nC
Gate to Source Charge		Q _{GS}			9		nC
Gate to Drain Charge		Q _{GD}			5		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =3.0A, R _G =25Ω (Note 1, 2)		22		ns
Rise Time		t _R			19		ns
Turn-OFF Delay Time		t _{D(OFF)}			45		ns
Fall-Time		t _F			35		ns
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				3	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				9	A
Diode Forward Voltage		V _{SD}	I _F =3.0A, V _{GS} =0V			1.4	V
Reverse Recovery Time		t _{rr}	I _S =3.0A, V _{GS} =0V,		950		ns
Reverse Recovery Charge (Note 1)		Q _{rr}	di _F /dt = 100 A/μs		5.4		uC

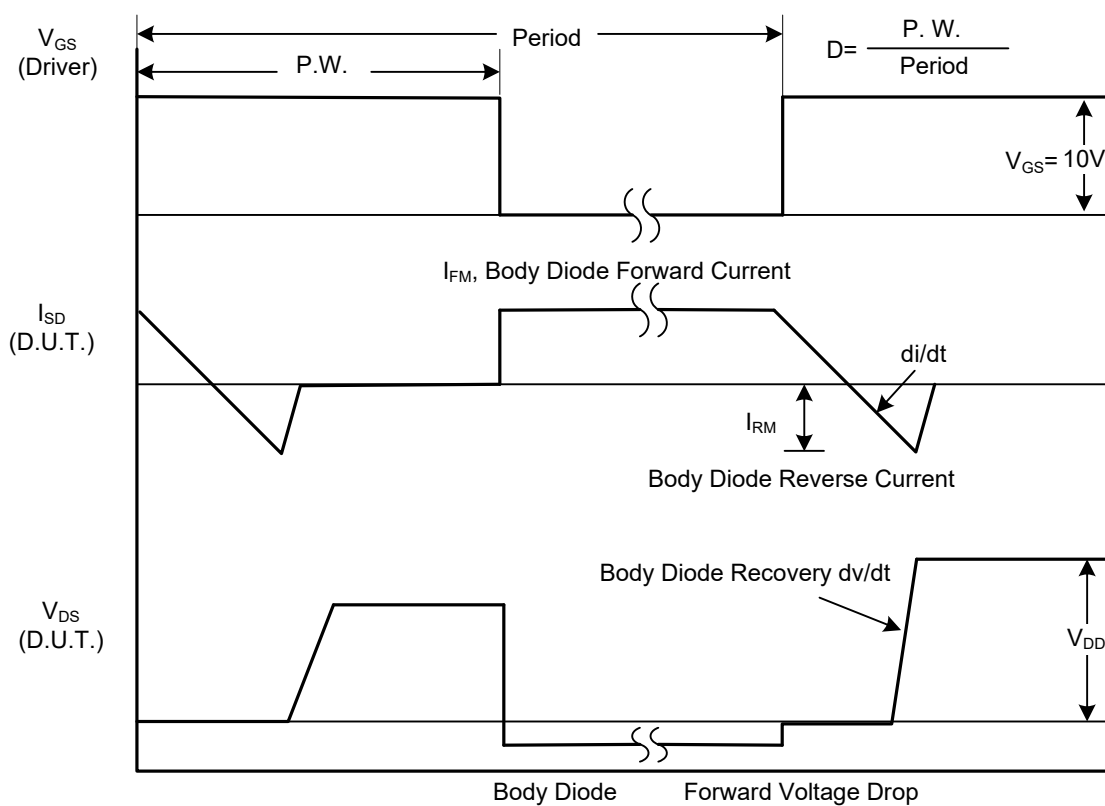
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

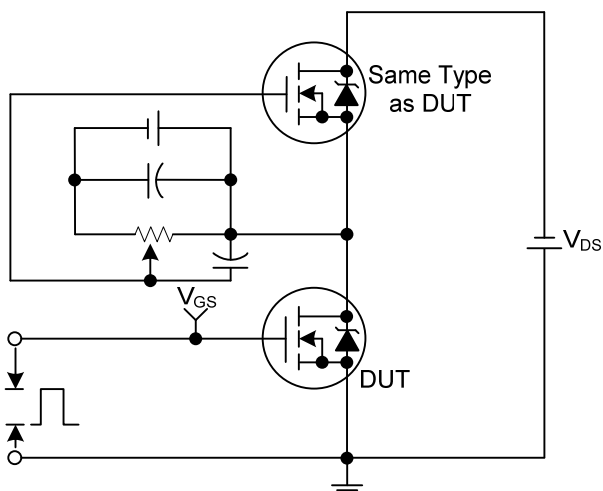


Peak Diode Recovery dv/dt Test Circuit

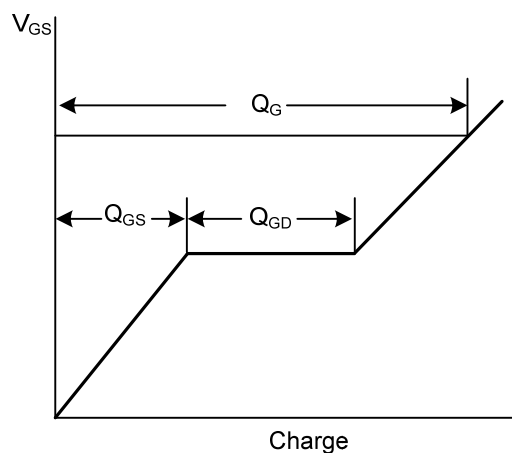


Peak Diode Recovery dv/dt Waveforms

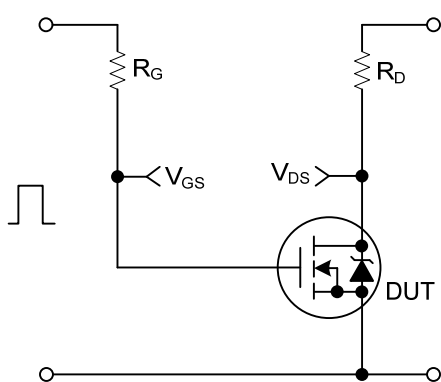
■ TEST CIRCUITS AND WAVEFORMS



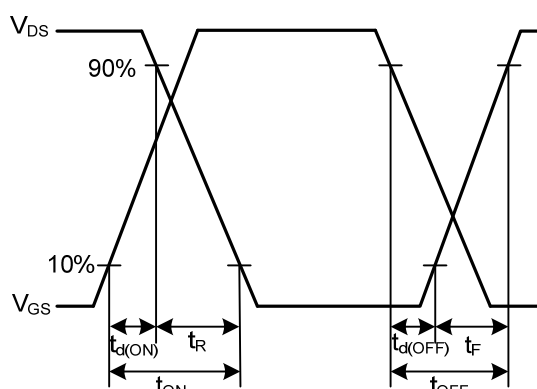
Gate Charge Test Circuit



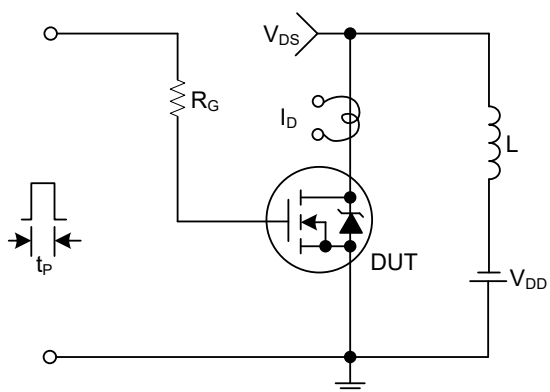
Gate Charge Waveforms



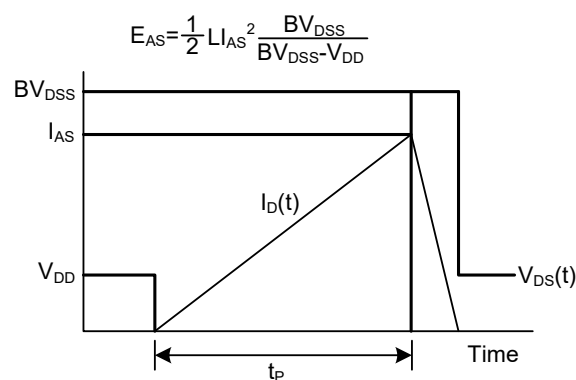
Resistive Switching Test Circuit



Resistive Switching Waveforms

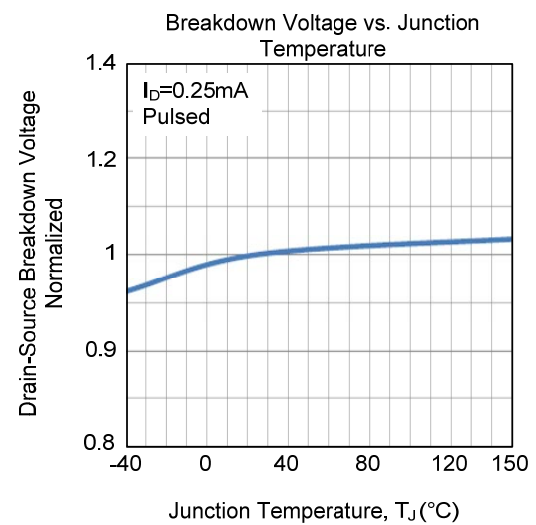
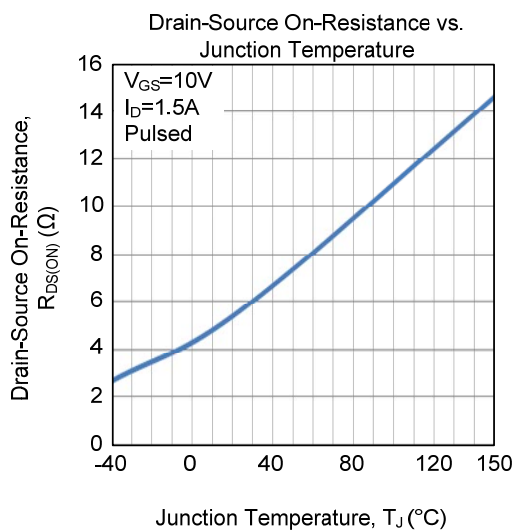
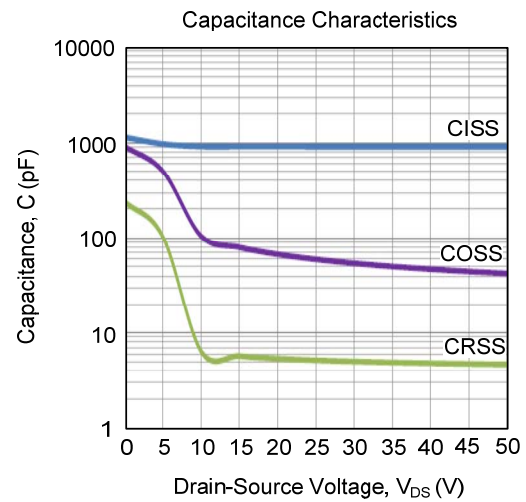
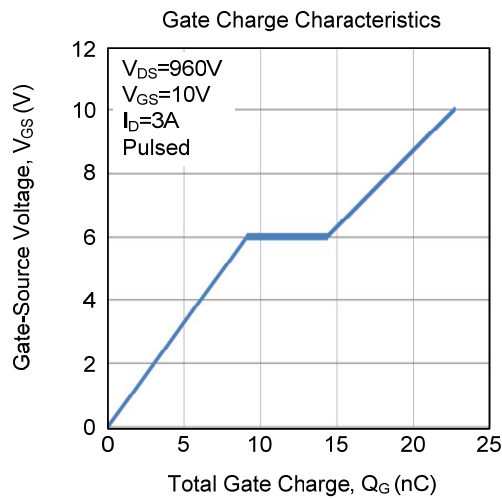
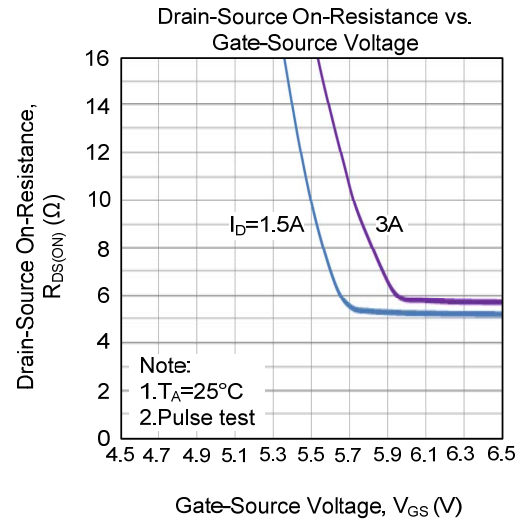
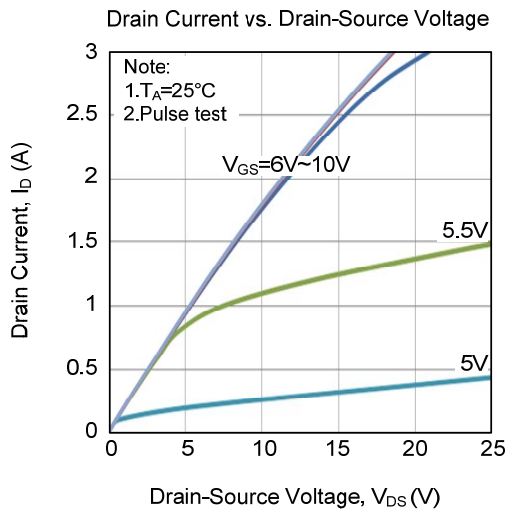


Unclamped Inductive Switching Test Circuit

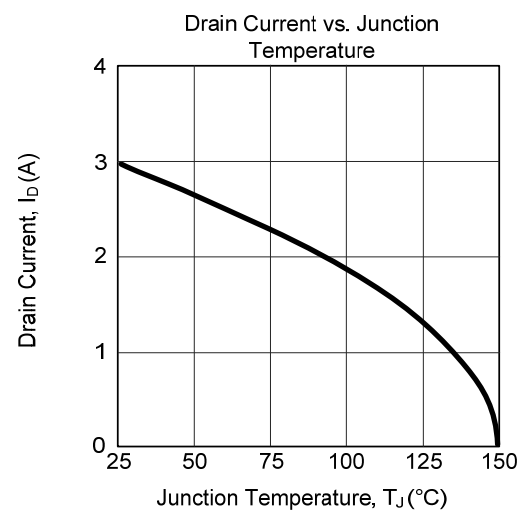
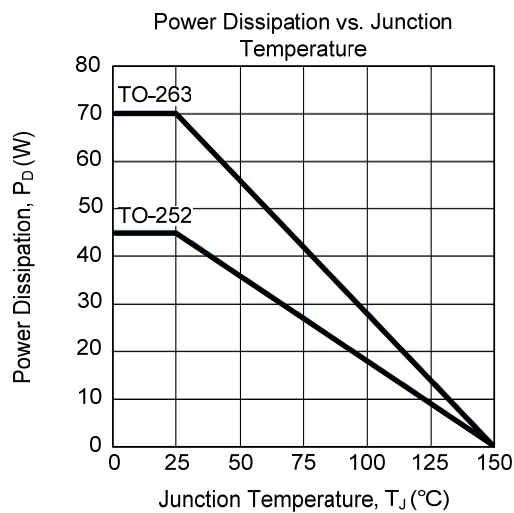
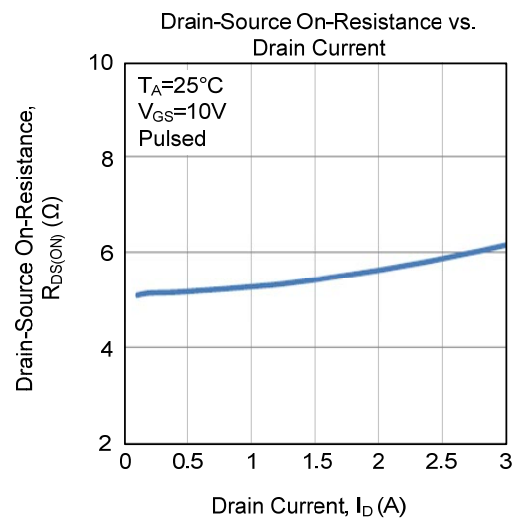
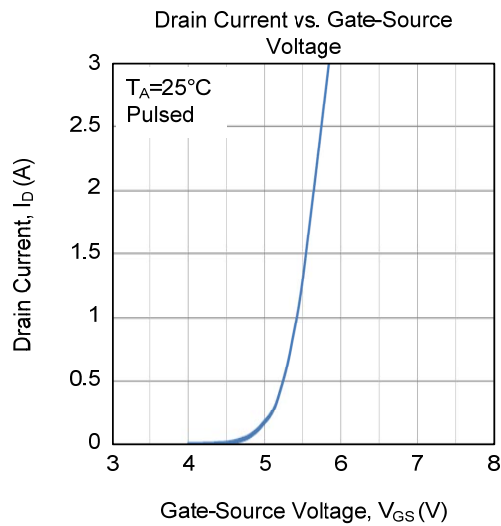
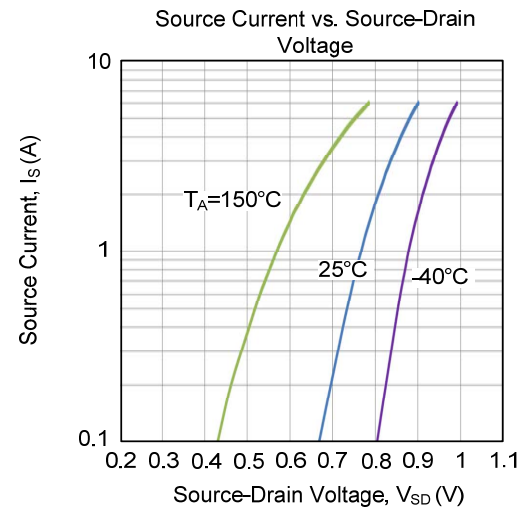
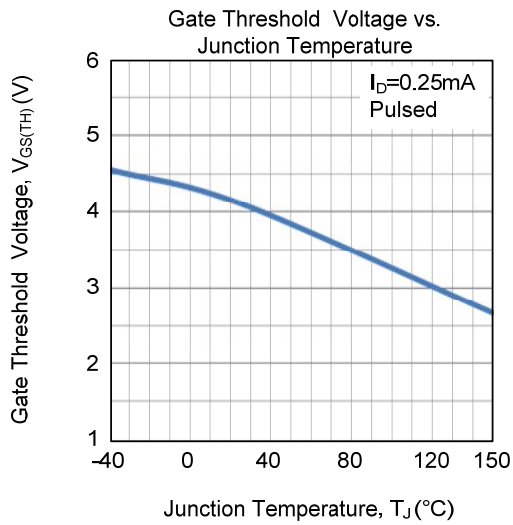


Unclamped Inductive Switching Waveforms

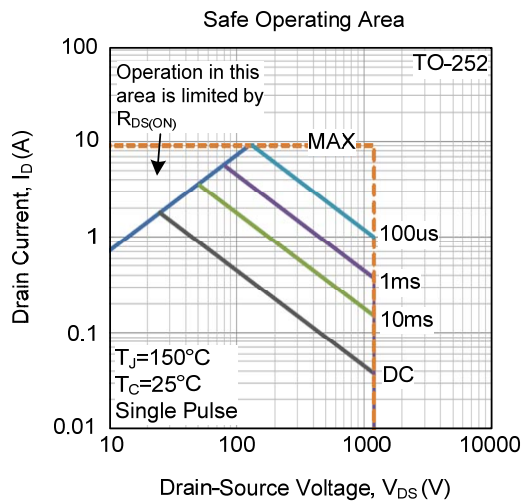
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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