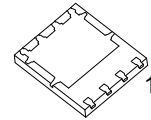
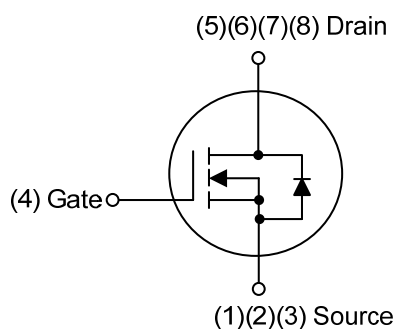


**USG03R014M-J****POWER MOSFET****207A, 30V N-CHANNEL
POWER MOSFET****DESCRIPTION**

The UTC **USG03R014M-J** adopts an ultra-deep trench design. The shielding gate is short-circuited to the source, which shields most of the Qgd charges, greatly reduces the Miller capacitance of the device, effectively increases the switching speed of the device, lowers switching losses, and deepens the trench depth. Reduce on-resistance and conduction loss.

FEATURES

- * $R_{DS(ON)} \leq 1.4 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=50\text{A}$
- * $R_{DS(ON)} \leq 2.2 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=50\text{A}$
- * High Switching Speed

SYMBOL

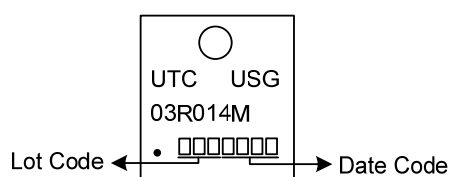
PDFN5×6-8L

ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
USG03R014ML-KAT-R	USG03R014MG-KAT-R	PDFN5×6-8L	S	S	S	G	D	D	D	D	Tape Reel

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

USG03R014MG-KAT-R	(1) Packing Type	(1) R: Tape Reel
	(2) Package Type	(2) KAT: PDFN5×6-8L
	(3) Green Package	(3) G: Halogen Free and Lead Free, K: Lead Free

MARKING

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

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V _{DSS}	30	V
Gate-Source Voltage			V _{GSS}	±20	V
Drain Current	Continuous	T _C =25°C	I _D	207	A
		T _C =100°C		133	A
	Pulsed (Note 2)		I _{DM}	827	A
Single Pulsed Avalanche Energy (Note 3)			E _{AS}	93	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	1.1	V/ns
Power Dissipation			P _D	89	W
Junction Temperature			T _J	+150	°C
Storage Temperature Range			T _{STG}	-20 ~ +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. $L=0.1\text{mH}$, $I_{AS} = 43\text{A}$, $V_{DD} = 25\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^{\circ}\text{C}$

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

■ **THERMAL DATA**

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	40	$^{\circ}\text{C}/\text{W}$
Junction to Case	θ_{JC}	1.4	$^{\circ}\text{C}/\text{W}$

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

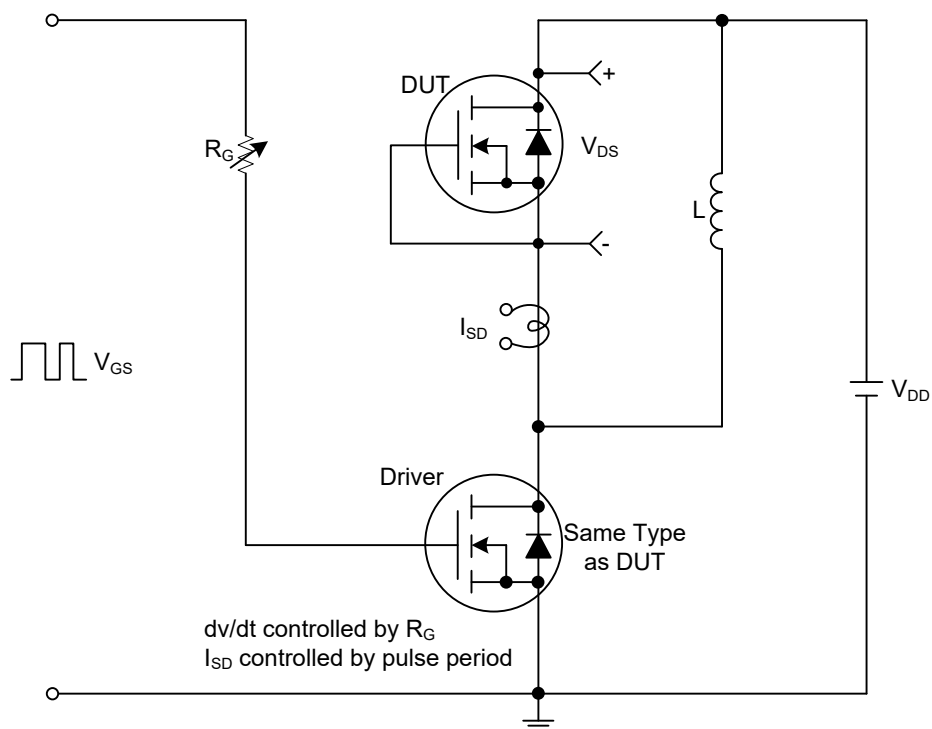
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	30			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =30V, 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	1.0		3.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =50A		1.0	1.4	mΩ
			V _{GS} =4.5V, I _D =50A		1.8	2.2	mΩ
Gate Resistance		g _{FS}	V _{DS} =5V, I _D =20A		35		S
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{DS} =15V, V _{GS} =0V, f=1.0MHz		2892		pF
Output Capacitance		C _{OSS}			2265		pF
Reverse Transfer Capacitance		C _{RSS}			174		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =15V, I _D =20A, V _{GS} =10V		51		nC
Gate to Source Charge		Q _{GS}			10.4		nC
Gate to Drain Charge		Q _{GD}			10.6		nC
Turn-on Delay Time (Note 1)		t _{D(ON)}	V _{DS} =15V, V _{GS} =10V, I _D =20A R _G =3Ω (Note 1, 2)		10.4		ns
Rise Time		t _R			17		ns
Turn-off Delay Time		t _{D(OFF)}			46		ns
Fall-Time		t _F			24		ns
Internal Gate Resistance		R _G	V _{DS} =V _{GS} =0V, f=1MHz		1.8		Ω
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				120	A
Diode Forward Voltage (Note 1)		V _{SD}	I _S =20A, V _{GS} =0V			1.2	V
Reverse Recovery Time (Note 1)		t _{rr}	I _F =30A, V _{GS} =0V,		120		nS
Reverse Recovery Charge		Q _{rr}	di _F /dt =100A/μs		218		nC

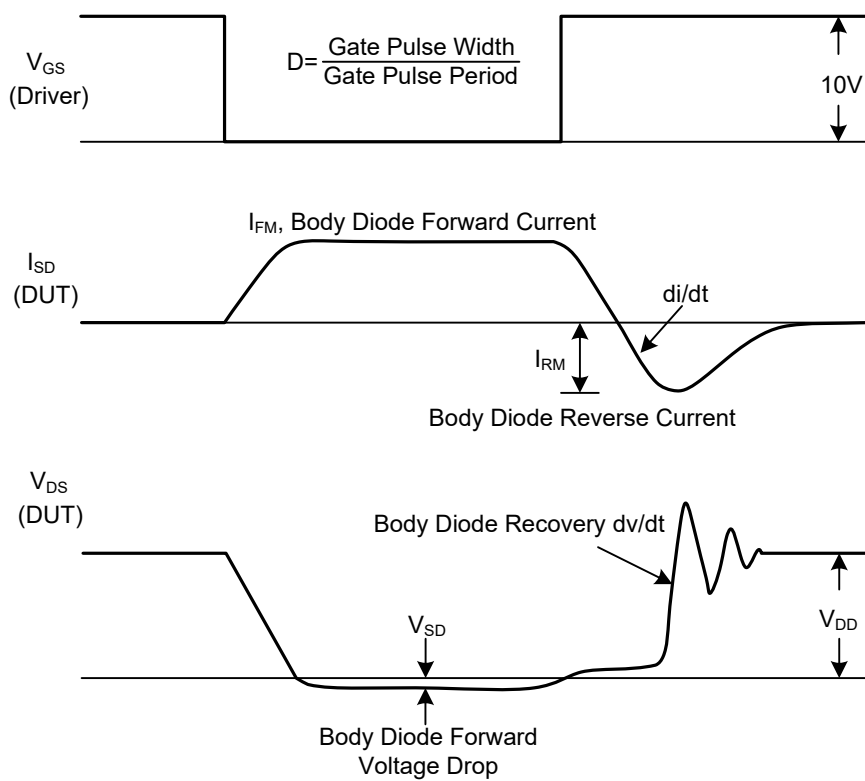
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

TEST CIRCUITS AND WAVEFORMS



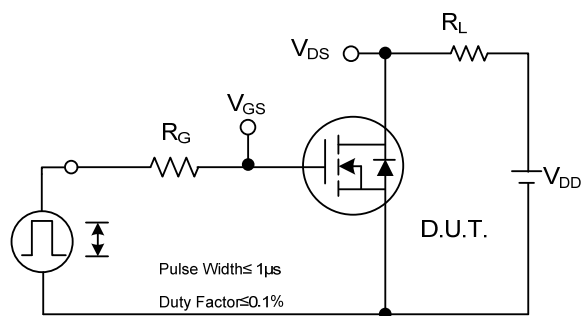
Peak Diode Recovery dv/dt Test Circuit



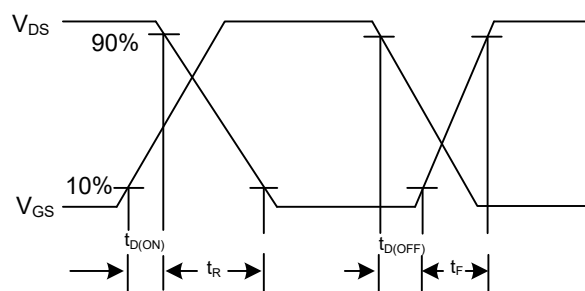
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

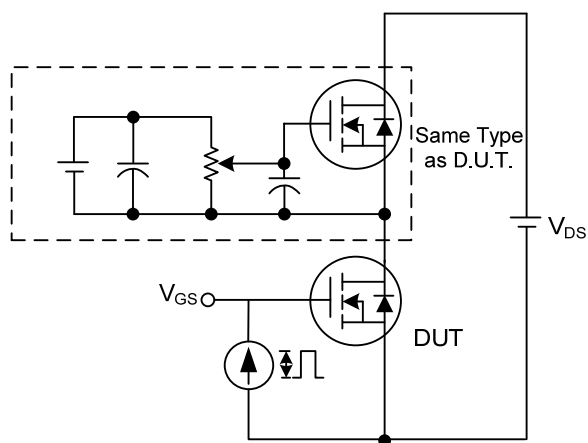
■ TEST CIRCUITS AND WAVEFORMS



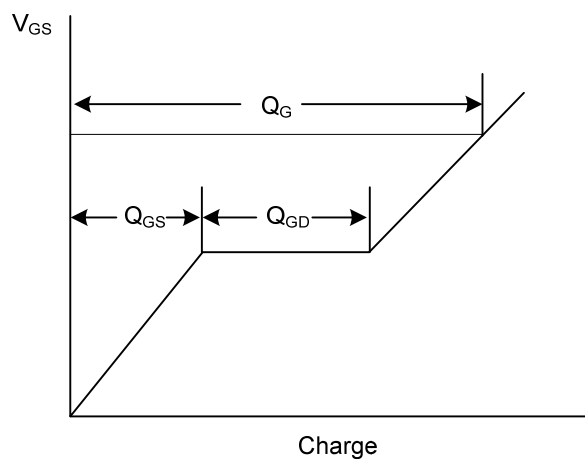
Switching Test Circuit



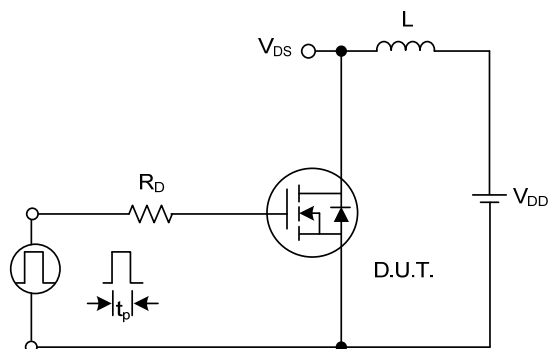
Switching Waveforms



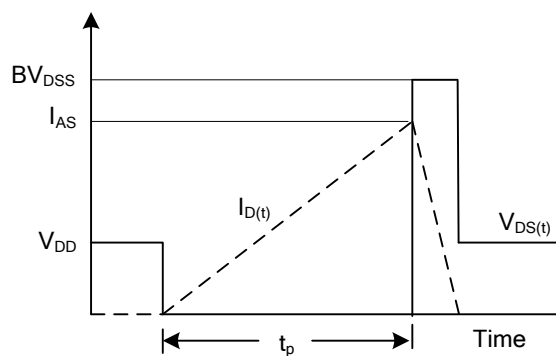
Gate Charge Test Circuit



Gate Charge Waveform

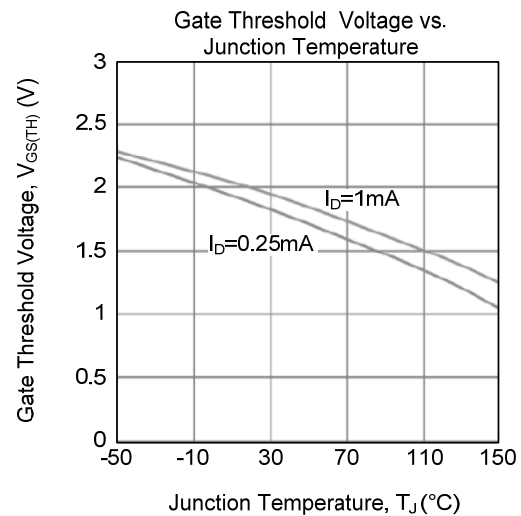
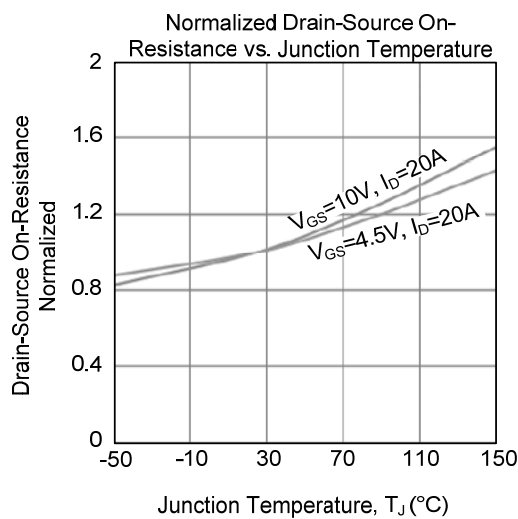
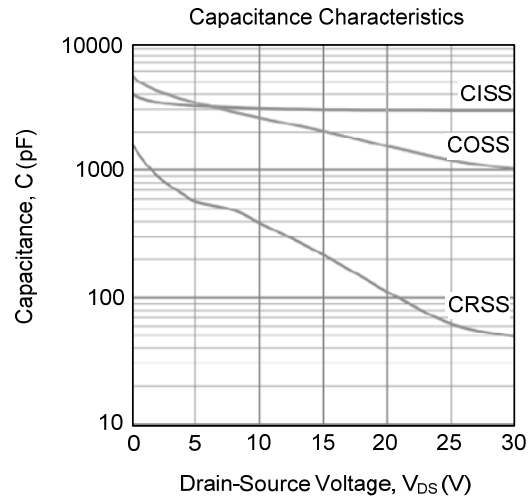
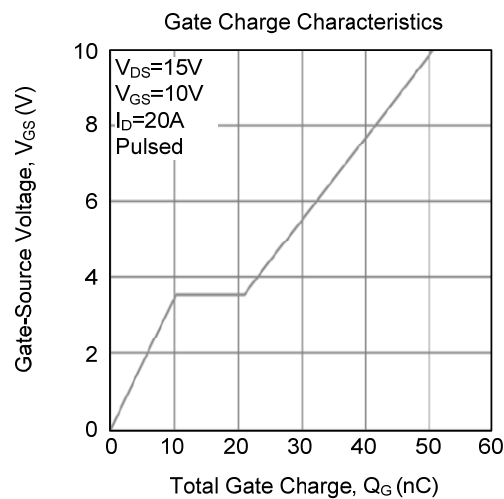
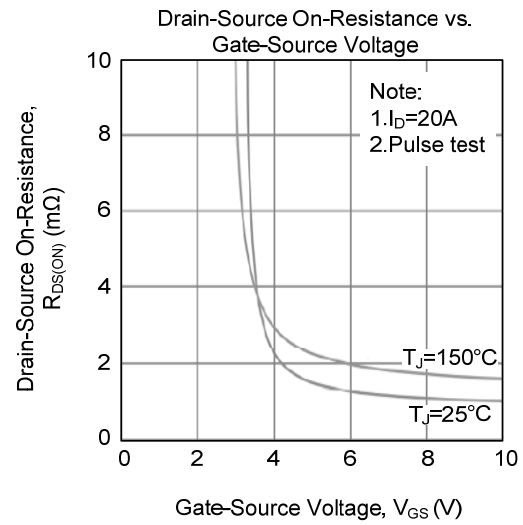
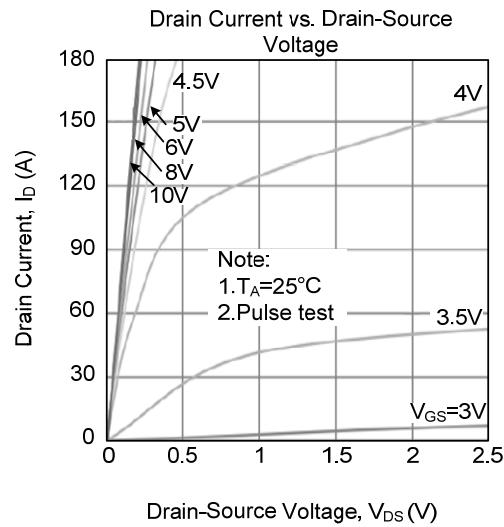


Unclamped Inductive Switching Test Circuit

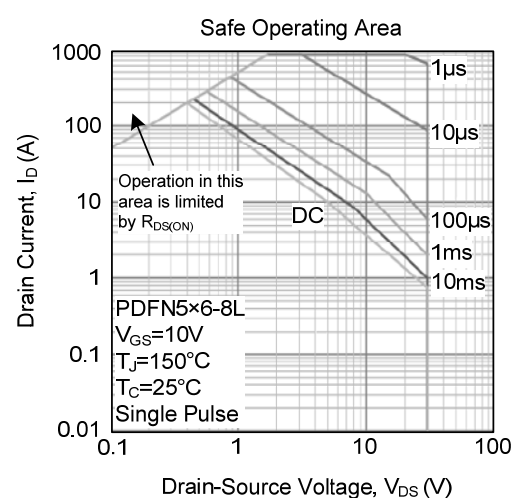
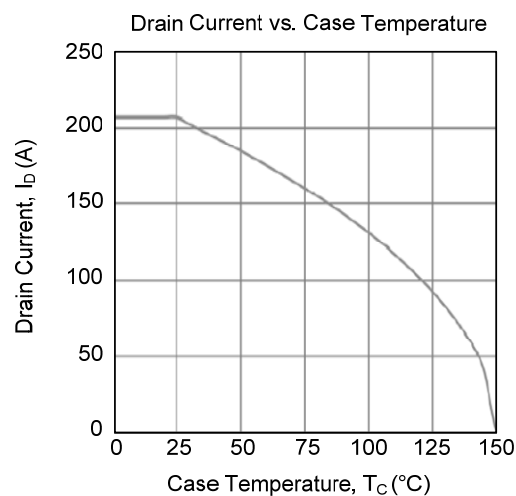
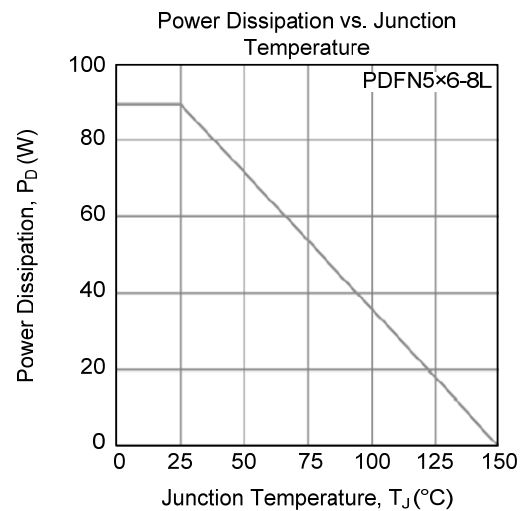
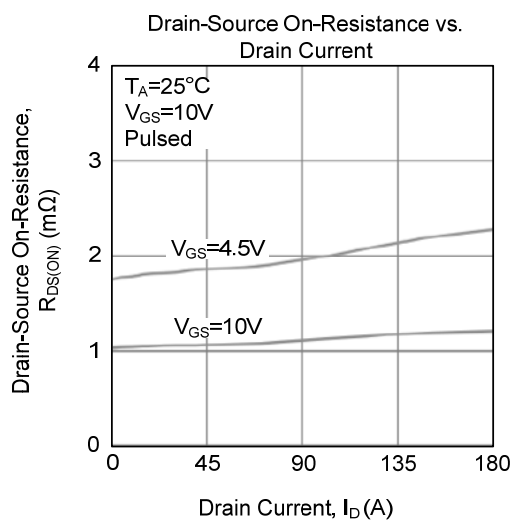
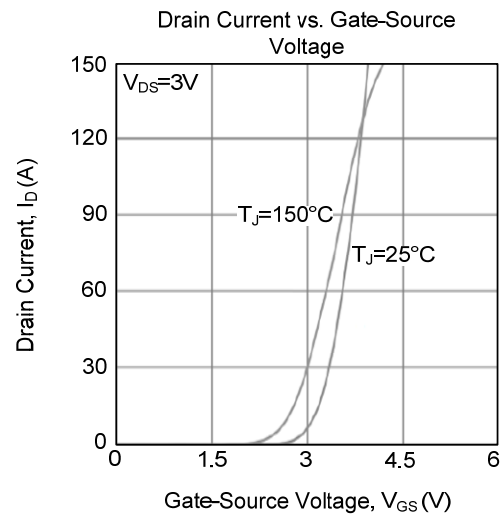
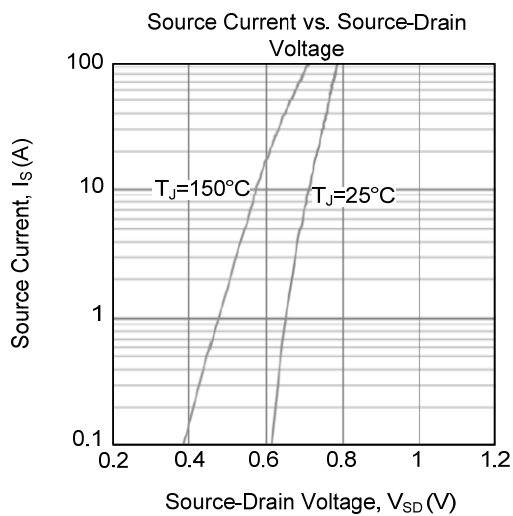


Unclamped Inductive Switching Waveforms

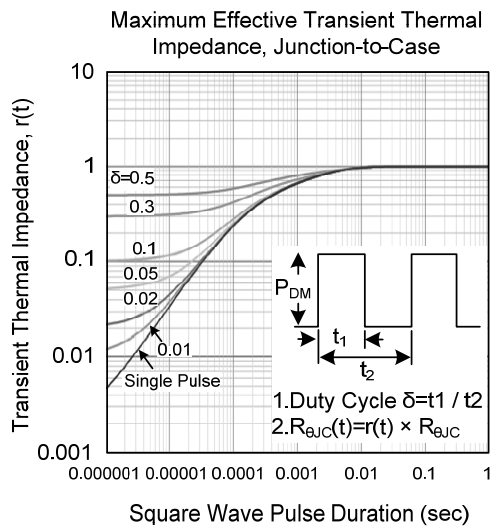
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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