

**UTT50P04****Power MOSFET****-40V, -50A P-CHANNEL
POWER MOSFET****DESCRIPTION**

The UTC **UTT50P04** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance, and it can also withstand high energy in the avalanche.

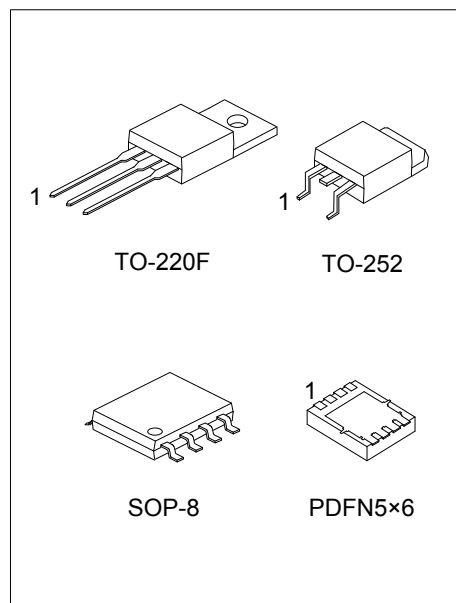
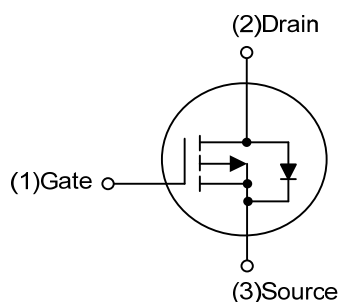
This UTC **UTT50P04** is suitable for motor drivers, high-side switch and 12V board net, etc.

FEATURES

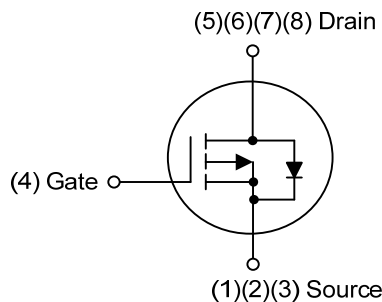
* $R_{DS(ON)} \leq 15 \text{ m}\Omega$ @ $V_{GS} = -10\text{V}$, $I_D = -30\text{A}$

$R_{DS(ON)} \leq 25 \text{ m}\Omega$ @ $V_{GS} = -4.5\text{V}$, $I_D = -20\text{A}$

* High Switching Speed

**SYMBOL**

TO-220F/TO-252



SOP-8/PDFN5x6

ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT50P04L-TF3-T	UTT50P04G-TF3-T	TO-220F	G	D	S	-	-	-	-	-	Tape Reel
UTT50P04L-TN3-R	UTT50P04G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UTT50P04L-S08-R	UTT50P04G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
UTT50P04L-P5060-R	UTT50P04G-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	Tape Reel

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

UTT50P04G-TF3-T		(1) Packing Type	(1) R: Tape Reel
		(2) Package Type	(2) TF3: TO-220F, TN3: TO-252, S08: SOP-8 P5060: PDFN5x6
		(3) Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

MARKING

PACKAGE	MARKING
TO-220F / TO-252	UTC UTT50P04 □□□□□□ Lot Code ← → Date Code L: Lead Free G: Halogen Free 1
SOP-8	8 7 6 5 UTC □□□□ UTT50P04 □□ • 1 2 3 4 → Date Code L: Lead Free G: Halogen Free → Lot Code
PDFN5×6	UTC UTT 50P04 • □□□□□□ Lot Code ← → Date Code

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DSS}	-40	V
Gate-Source Voltage		V _{GSS}	±20	V
Drain Current	Continuous	I _D	-50 (Note 2)	A
	Pulsed	I _{DM}	-100	A
Continuous Source Current (Diode Conduction)		I _S	-50 (Note 2)	A
Avalanche Current		I _{AR}	-40	A
Avalanche Energy		E _{AS}	80	mJ
Power Dissipation	TO-220F	P _D	38	W
	TO-252		56	W
	SOP-8		2.2	W
	PDFN5×6		12	W
Junction Temperature		T _J	-55 ~ +150	°C
Storage Temperature		T _{STG}	-55 ~ +150	°C

Note: 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.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F/TO-252	θ _{JA}	110	°C/W
	SOP-8		100 (Note 2)	°C/W
	PDFN5×6		65 (Note 2)	°C/W
Junction to Case	TO-220F	θ _{JC}	3.28	°C/W
	TO-252		2.5 (Note 2)	°C/W
	SOP-8		56 (Note 2)	°C/W
	PDFN5×6		10.4 (Note 2)	°C/W

Notes: 1. Calculated based on maximum allowable Junction Temperature. Package limitation current is 50A.
2. 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)

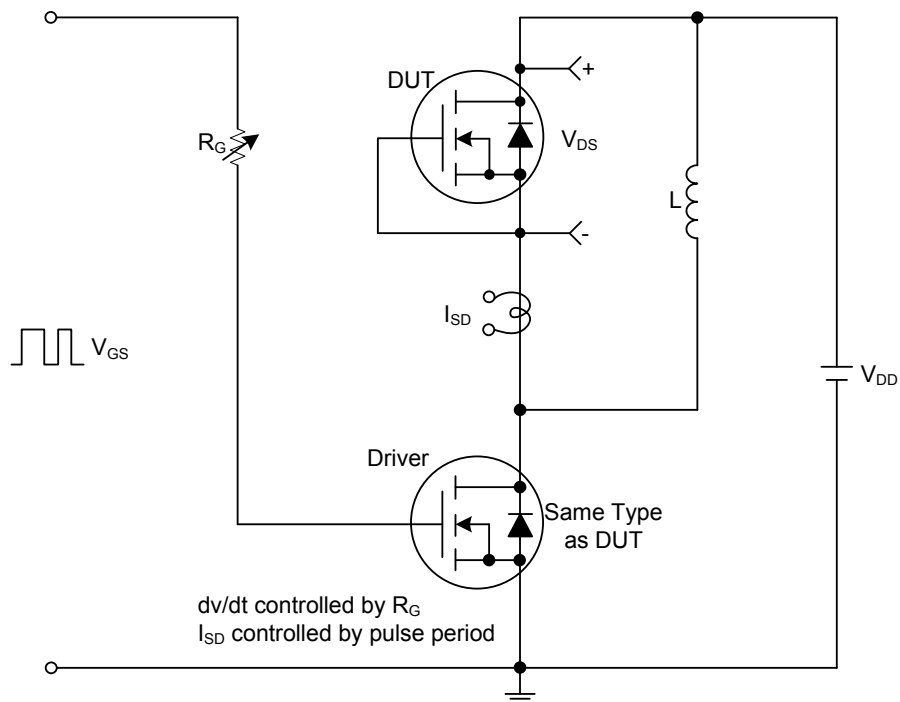
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =-250μA, V _{GS} =0V	-40			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =-40V, V _{GS} =0V			-1	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =+20V, V _{DS} =0V			+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 (Note 1)		R _{DS(ON)}	V _{GS} =-10V, I _D =-30A			15	mΩ
			V _{GS} =-4.5V, I _D =-20A			25	mΩ
DYNAMIC PARAMETERS (Note 2)							
Input Capacitance		C _{ISS}	V _{DS} =-25V, V _{GS} =0V, f=1MHz		2930		pF
Output Capacitance		C _{OSS}			385		pF
Reverse Transfer Capacitance		C _{RSS}			291		pF
SWITCHING PARAMETERS (Note 2)							
Total Gate Charge (Note 3)		Q _G	V _{GS} =-5V, V _{DS} =-32V, I _D =-50A		32.5		nC
			V _{GS} =-10V, V _{DS} =-32V, I _D =-50A I _G =1mA		57.8		nC
Gate to Source Charge (Note 3)	Q _{GS}			8		nC	
Gate to Drain Charge (Note 3)	Q _{GD}			16		nC	
Turn-ON Delay Time (Note 3)	t _{D(ON)}	V _{DD} =-20V, V _{GEN} =-10V, I _D ≈-50A, R _L =0.4Ω , R _G =3Ω			11		ns
Rise Time (Note 3)	t _R			18		ns	
Turn-OFF Delay Time (Note 3)	t _{D(OFF)}			53		ns	
Fall-Time (Note 3)	t _F			36		ns	
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS (T _C =25°C)							
Maximum Body-Diode Pulsed Current		I _{SM}				-50	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _F =-50A, V _{GS} =0V			-1.5	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =-30A , V _{GS} =0V,		72		ns
Reverse Recovery Charge		Q _{rr}	di/dt=100A/μs		100		nC

Notes: 1. Pulse test; pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

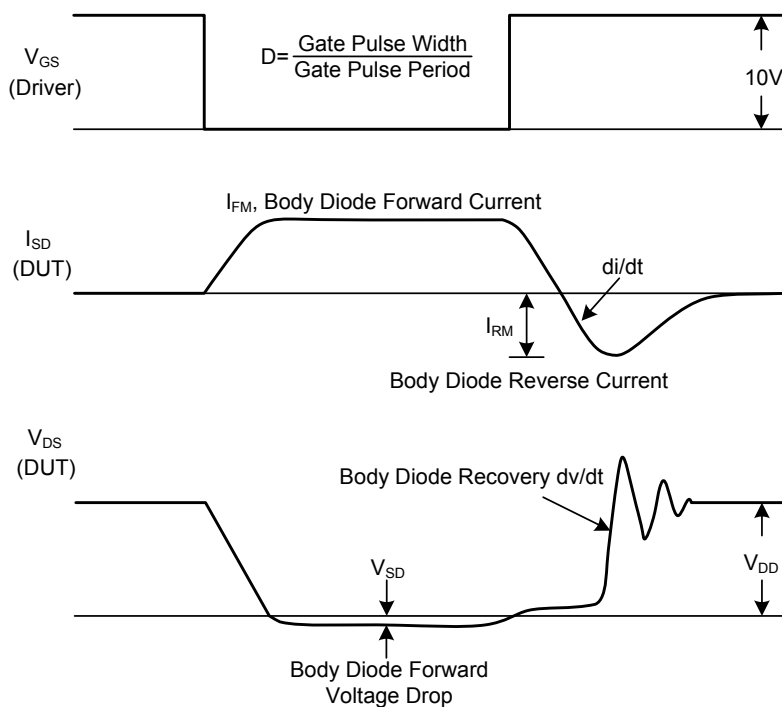
2. Guaranteed by design, not subject to production testing.

3. Independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



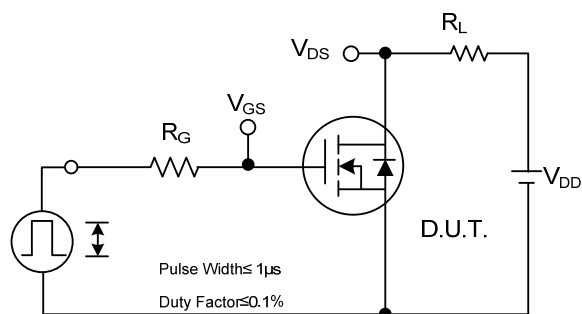
Peak Diode Recovery dv/dt Test Circuit



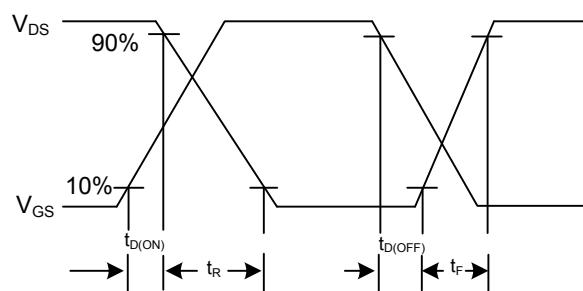
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

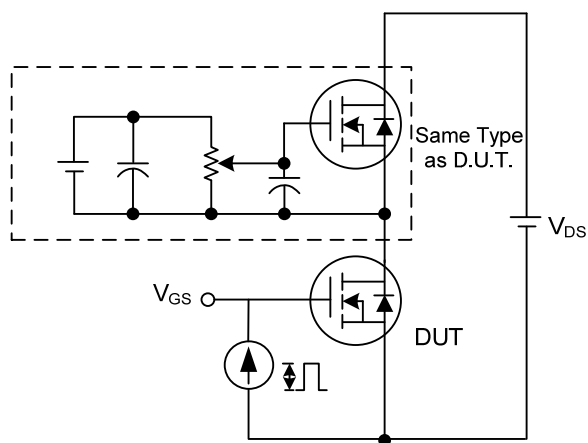
■ TEST CIRCUITS AND WAVEFORMS



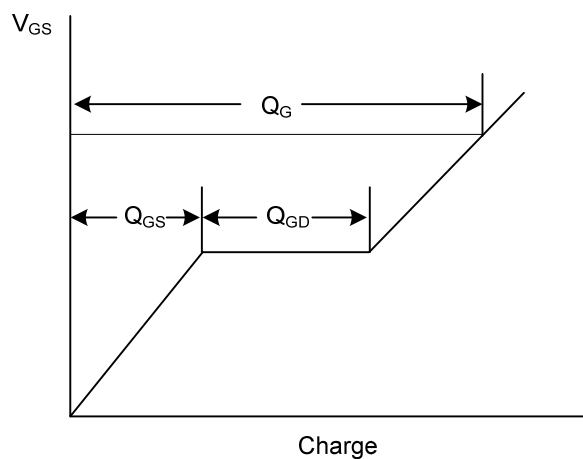
Switching Test Circuit



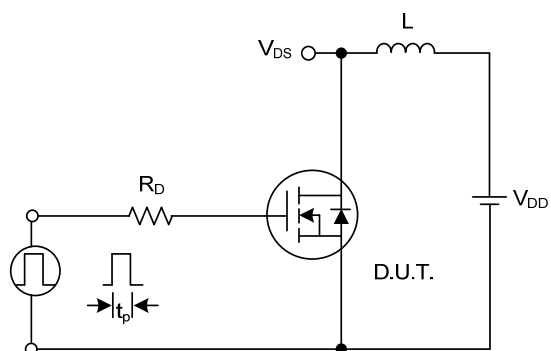
Switching Waveforms



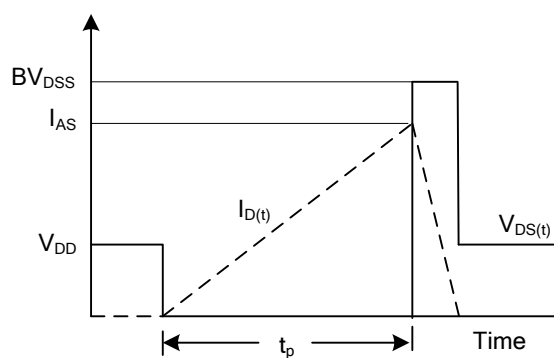
Gate Charge Test Circuit



Gate Charge Waveform

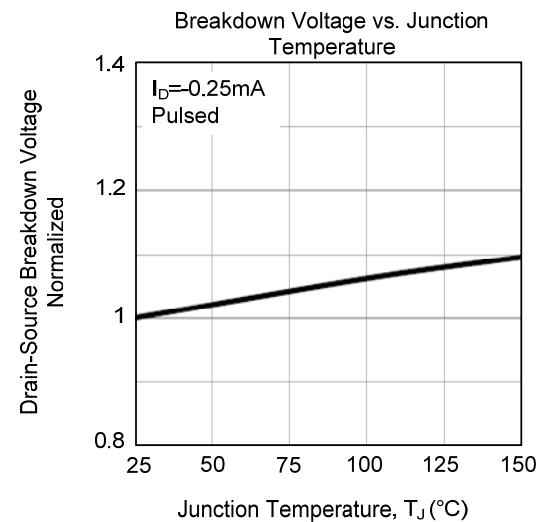
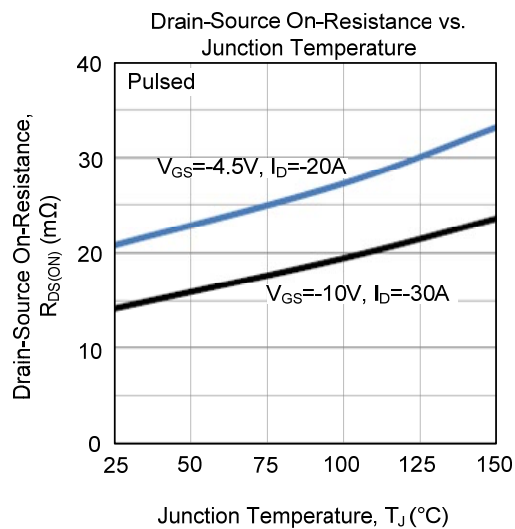
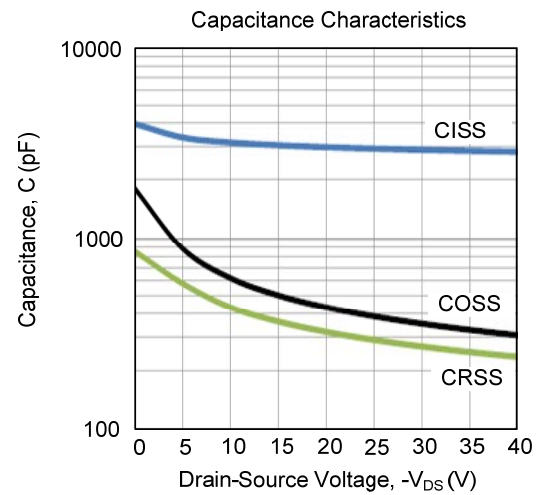
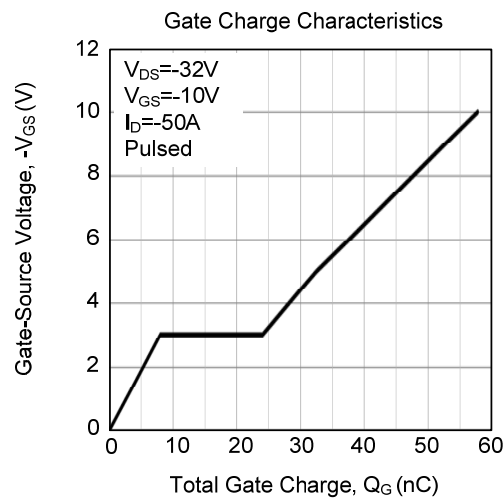
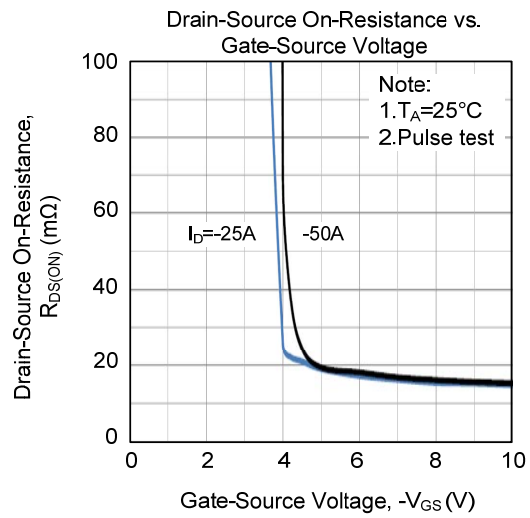
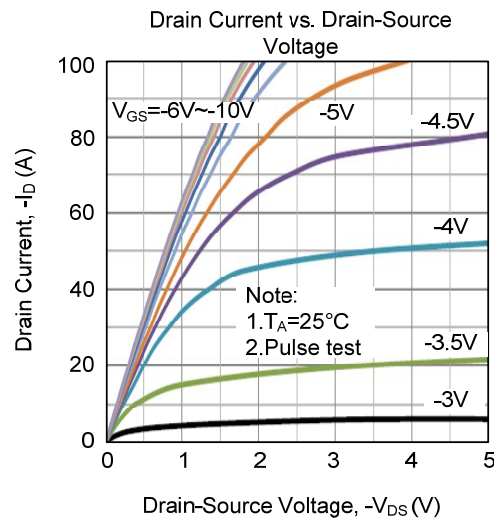


Unclamped Inductive Switching Test Circuit

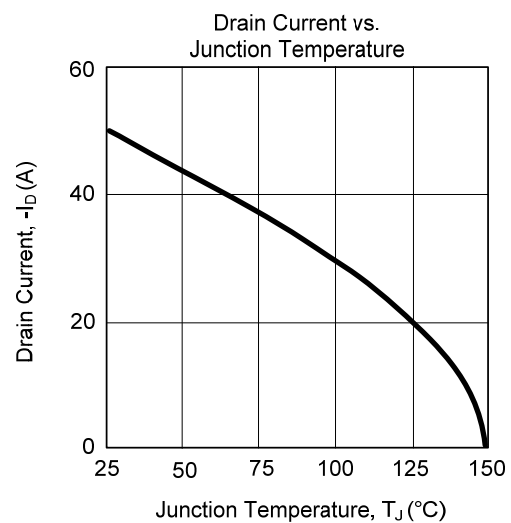
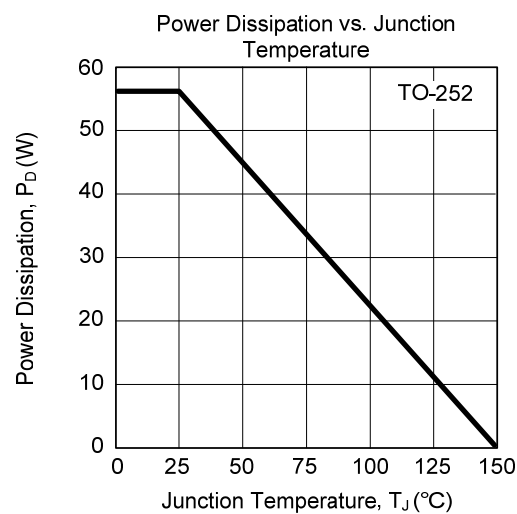
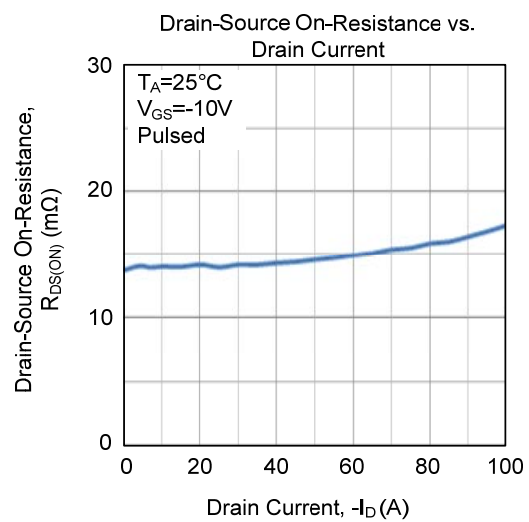
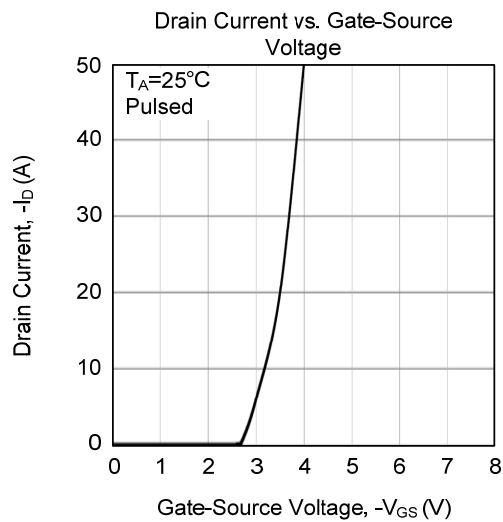
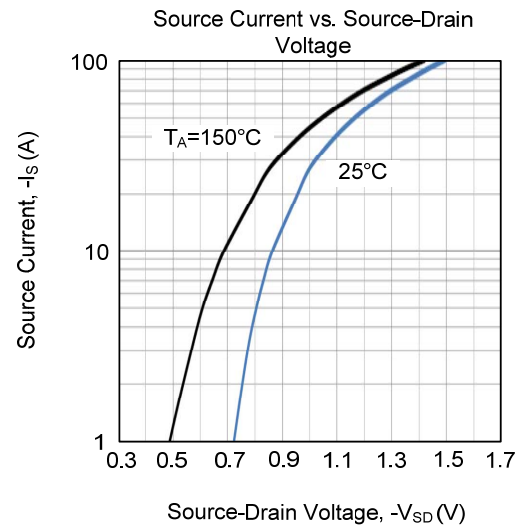
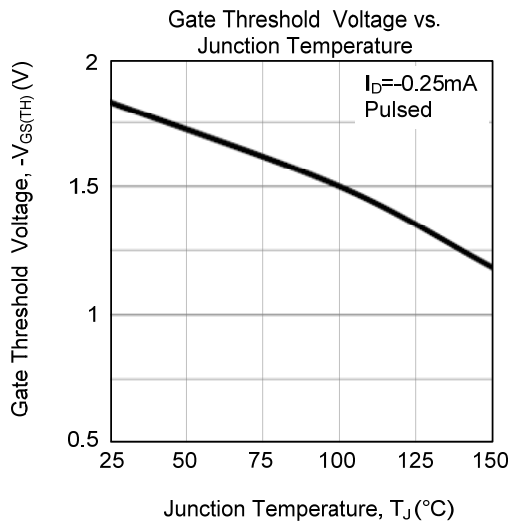


Unclamped Inductive Switching Waveforms

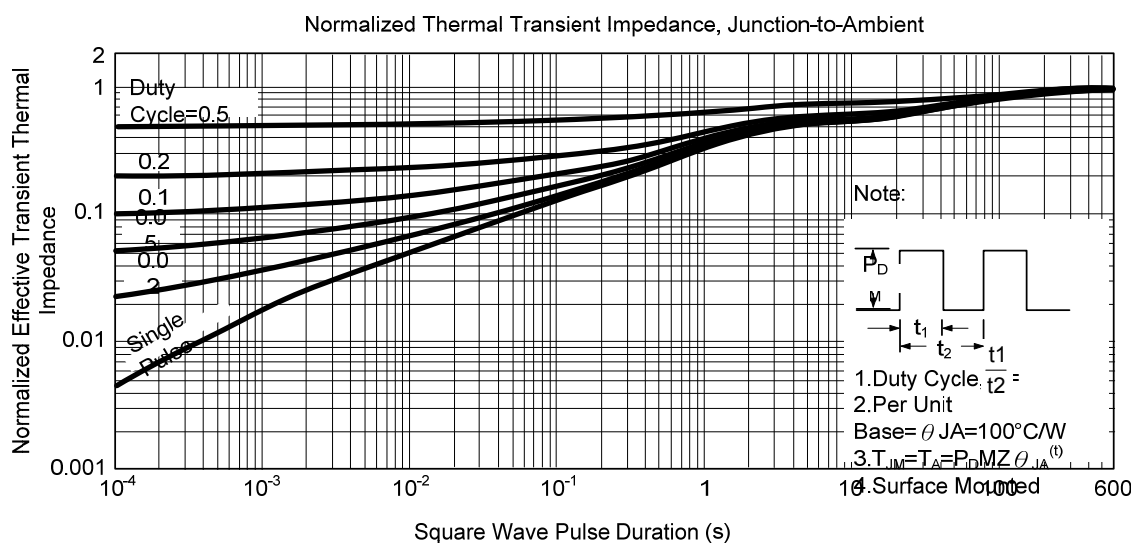
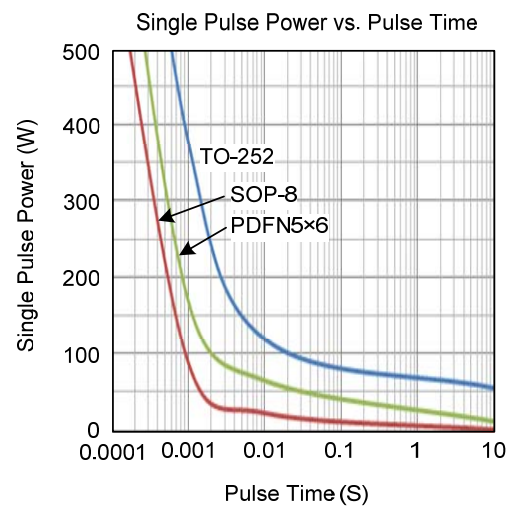
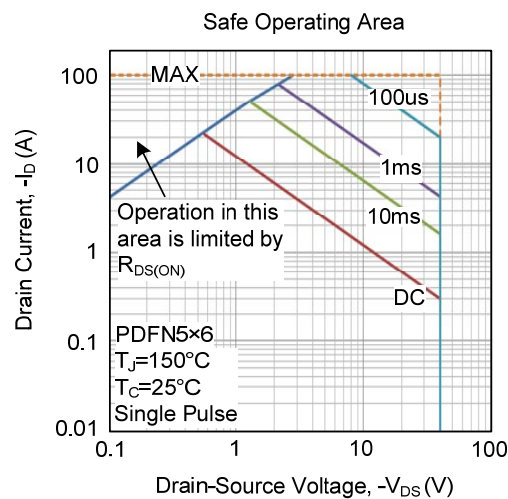
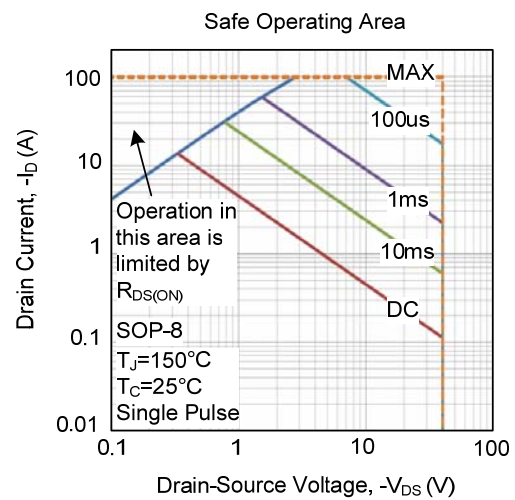
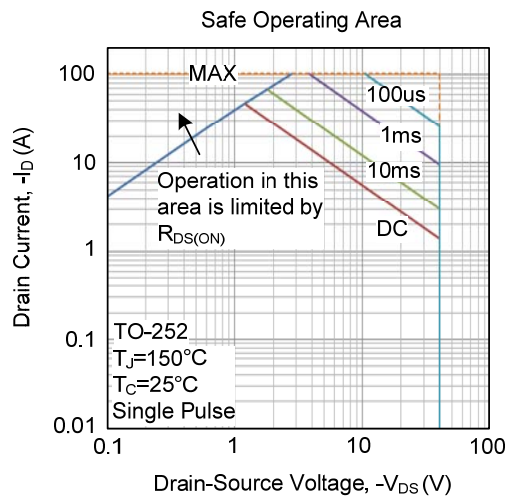
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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