



UT18NP06

Power MOSFET

DUAL ENHANCEMENT MODE (N-CHANNEL / P-CHANNEL)

■ DESCRIPTION

The UTC **UT18NP06** incorporates a N-channel MOSFET and a P-channel MOSFET, it uses UTC's advanced technology to provide customers a minimum on-state resistance, high switching speed, low gate charge and cost effectiveness.

The UTC **UT18NP06** is universally applied in low voltage applications.

■ FEATURES

*N-CHANNEL

$$R_{DS(on)} \leq 18 \text{ m}\Omega @ V_{GS}=10V, I_D=4.5A$$

$$R_{DS(on)} \leq 28 \text{ m}\Omega @ V_{GS}=4.5V, I_D=4.5A$$

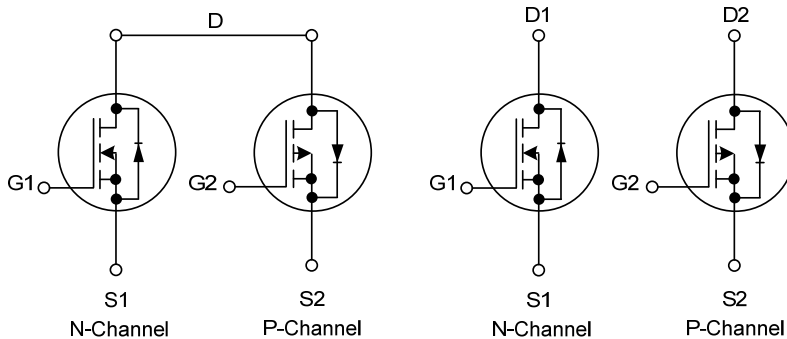
*P-CHANNEL

$$R_{DS(on)} \leq 50 \text{ m}\Omega @ V_{GS}=-10V, I_D=-4.5A$$

$$R_{DS(on)} \leq 70 \text{ m}\Omega @ V_{GS}=-4.5V, I_D=-4.5A$$

* High switching speed

■ SYMBOL



TO-252-4

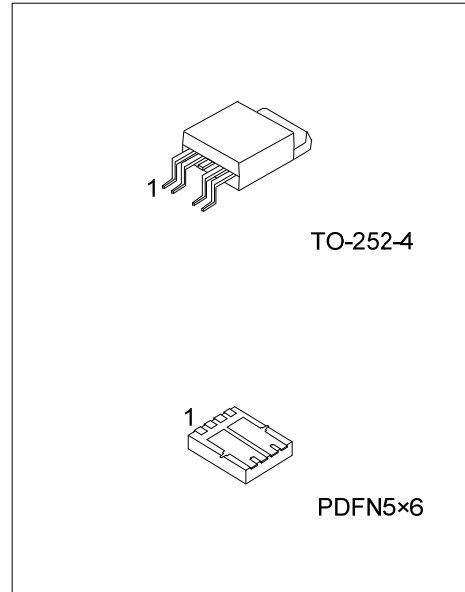
PDFN5x6

■ ORDERING INFORMATION

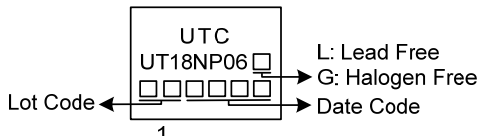
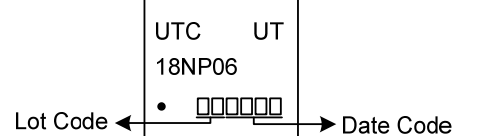
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT18NP06L-TN4-R	UT18NP06G-TN4-R	TO-252-4	S1	G1	D	S2	G2	-	-	-	Tape Reel
UT18NP06L-P5060-R	UT18NP06G-P5060-R	PDFN5x6	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

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

<p>UT18NP06G-TN4-R</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) R: Tape Reel (2) TN4: TO-252-4, P5060: PDFN5x6 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING

TO-252-4	PDFN5x6
 <p>Diagram showing marking on a TO-252-4 package. The marking includes 'UTC', 'UT18NP06', and a small square symbol. Below this is a row of five squares, with the first one labeled '1'. To the left, an arrow points to the first square with the label 'Lot Code'. To the right, an arrow points to the last square with the label 'Date Code'. Further right, two arrows point to the 'L: Lead Free' and 'G: Halogen Free' text.</p>	 <p>Diagram showing marking on a PDFN5x6 package. The marking includes 'UTC', 'UT', '18NP06', and a small square symbol. Below this is a row of five squares, with the first one containing a dot. To the left, an arrow points to the first square with the label 'Lot Code'. To the right, an arrow points to the last square with the label 'Date Code'.</p>

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

PARAMETER		SYMBOL	RATINGS		UNIT
			N-CH	P-CH	
Drain-Source Voltage		V_{DSS}	60	-60	V
Gate-Source Voltage		V_{GSS}	± 20	± 20	V
Drain Current	Continuous	$T_C=25^\circ\text{C}$ I_D	9	-9	A
	Pulsed	I_{DM}	36	-36	A
Avalanche Energy, Single Pulse		E_{AS}	31	20	mJ
Power Dissipation	TO-252-4	P_D	48		W
	PDFN5x6		30		W
Junction Temperature		T_J	+150		$^\circ\text{C}$
Range of Storage Temperature		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. N-Channel: $L=0.1\text{mH}$, $I_{AS}=25\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
 P-Channel: $L=0.1\text{mH}$, $I_{AS}=-20\text{A}$, $V_{DD}=-50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252-4			
	PDFN5x6	65	$^\circ\text{C/W}$	
Junction to Case	TO-252-4	θ_{JC}	2.6 (Note)	$^\circ\text{C/W}$
	PDFN5x6		4.16 (Note)	$^\circ\text{C/W}$

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

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

N-Channel

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	60			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V, T _J =25°C			1	μA
		V _{DS} =48V, V _{GS} =0V, T _J =125°C			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}				
	Reverse					
		V _{GS} =+20V			+100	nA
		V _{GS} =-20V			-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)	R _{DS(ON)}	V _{GS} =10V, I _D =4.5A			18	mΩ
		V _{GS} =4.5V, I _D =4.5A			28	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		2235		pF
Output Capacitance	C _{OSS}			170		pF
Reverse Transfer Capacitance	C _{RSS}			135		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note)	Q _G	V _{DS} =48V, V _{GS} =10V, I _D =9.0A		56		nC
Gate to Source Charge	Q _{GS}			9		nC
Gate to Drain Charge	Q _{GD}			11		nC
Turn-ON Delay Time (Note)	t _{D(ON)}	V _{DD} =30V, V _{GS} =10V, I _D =9.0A, R _G =3.0Ω		10		ns
Rise Time	t _R			18		ns
Turn-OFF Delay Time	t _{D(OFF)}			42		ns
Fall-Time	t _F			21		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				9	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				18	A
Drain-Source Diode Forward Voltage (Note)	V _{SD}	I _S =9.0A, V _{GS} =0V			1.4	V

■ ELECTRICAL CHARACTERISTICS (Cont.)

P-Channel

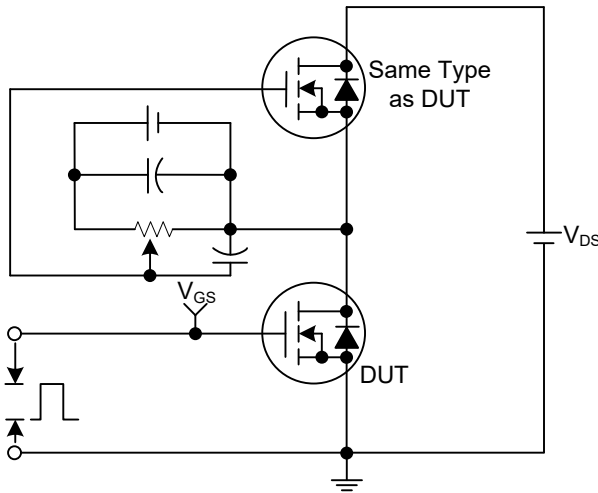
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = -250\mu A, V_{GS} = 0V$	-60			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = -60V, V_{GS} = 0V, T_J = 25^\circ C$			-1	μA
		$V_{DS} = -48V, V_{GS} = 0V, T_J = 125^\circ C$			-10	μA
Gate-Source Leakage Current	Forward	I_{GSS}			+100	nA
	Reverse					
					-100	nA
		$V_{GS} = -20V$				
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.0		-3.0	V
Static Drain-Source On-State Resistance (Note)	$R_{DS(ON)}$	$V_{GS} = -10V, I_D = -4.5A$			50	m Ω
		$V_{GS} = -4.5V, I_D = -4.5A$			70	m Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS} = 0V, V_{DS} = -25V, f = 1.0MHz$		1830		pF
Output Capacitance	C_{OSS}			120		pF
Reverse Transfer Capacitance	C_{RSS}			98		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note)	Q_G	$V_{DS} = -48V, V_{GS} = -10V, I_D = -9.0A$		35		nC
Gate to Source Charge	Q_{GS}			7		nC
Gate to Drain Charge	Q_{GD}			7.5		nC
Turn-ON Delay Time (Note)	$t_{D(ON)}$	$V_{DD} = -30V, V_{GS} = -10V, I_D = -9.0A, R_G = 3.0\Omega$		8		ns
Rise Time	t_R			18		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			36		ns
Fall-Time	t_F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				-9	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				-18	A
Drain-Source Diode Forward Voltage (Note)	V_{SD}	$I_S = -9.0A, V_{GS} = 0V$			-1.4	V

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

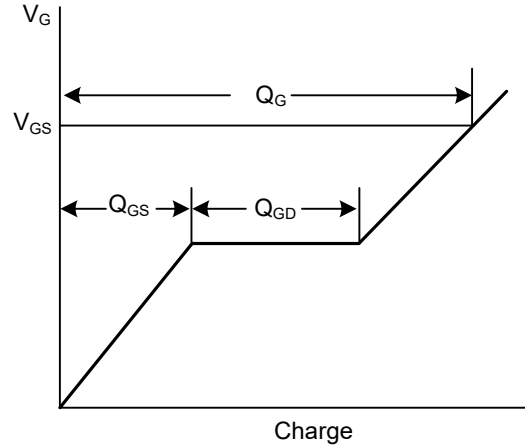
2. Essentially independent of operating ambient temperature.

TEST CIRCUITS AND WAVEFORMS

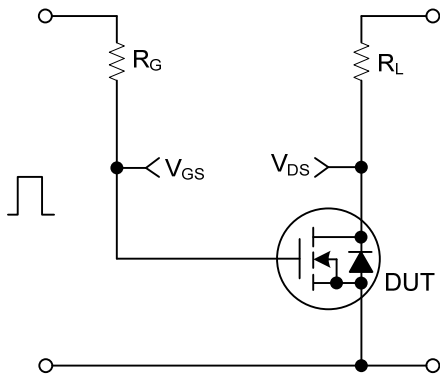
N-CHANNEL



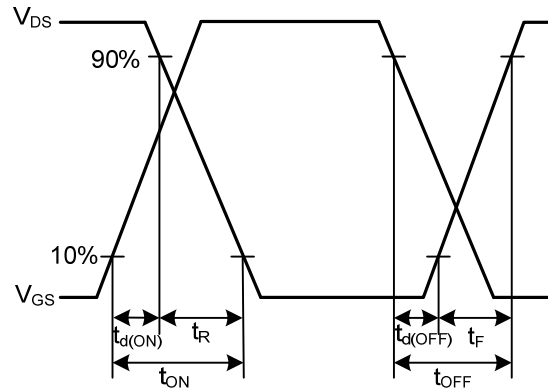
Gate Charge Test Circuit



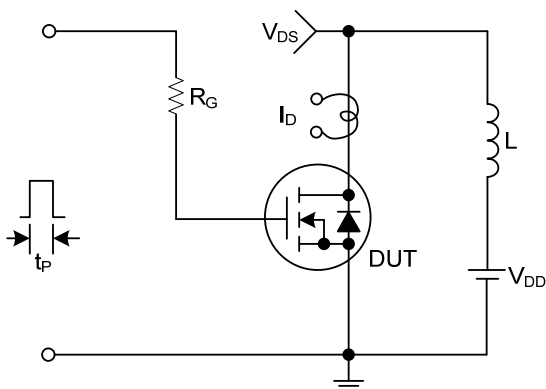
Gate Charge Waveforms



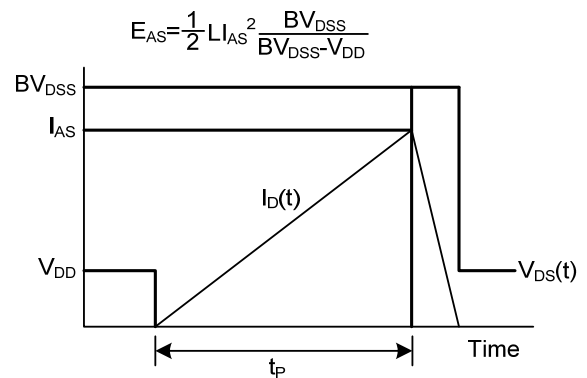
Resistive Switching Test Circuit



Resistive Switching Waveforms



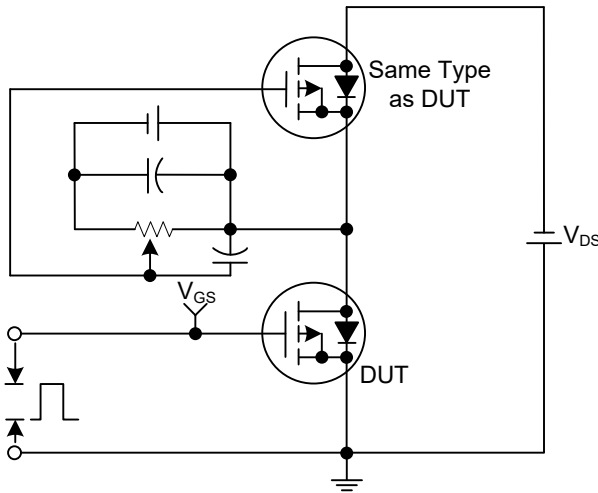
Unclamped Inductive Switching Test Circuit



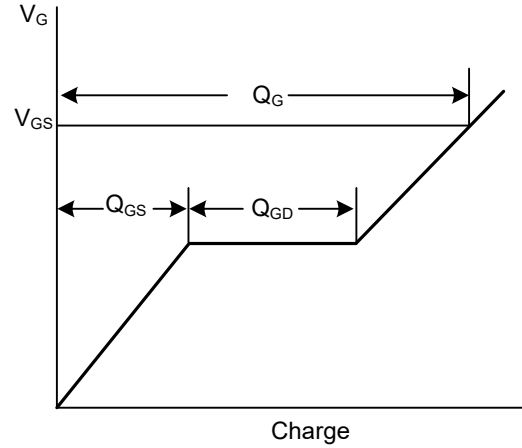
Unclamped Inductive Switching Waveforms

TEST CIRCUITS AND WAVEFORMS

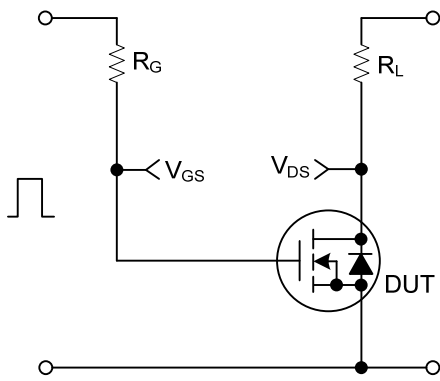
P-CHANNEL



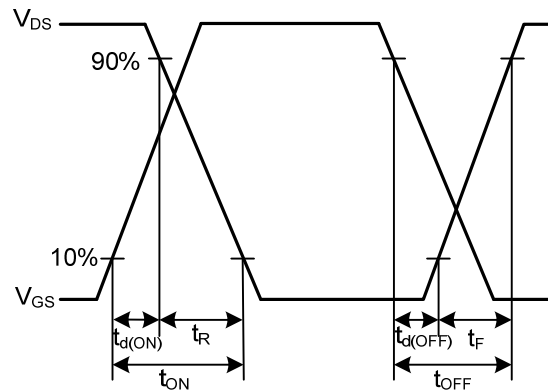
Gate Charge Test Circuit



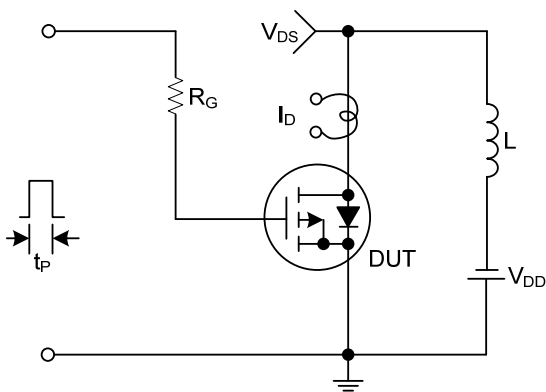
Gate Charge Waveforms



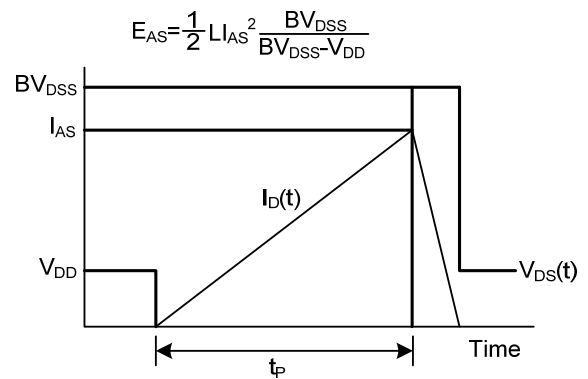
Resistive Switching Test Circuit



Resistive Switching Waveforms



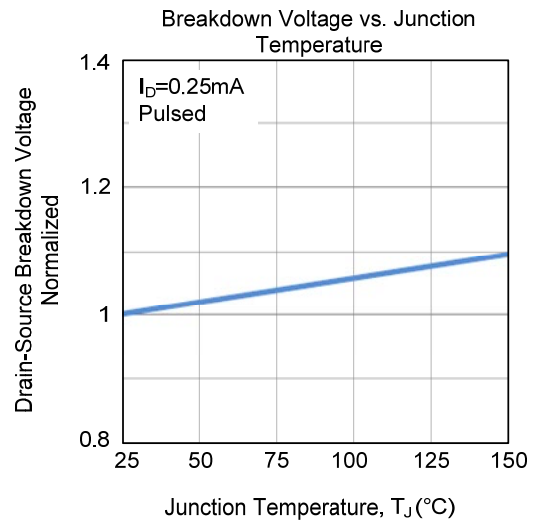
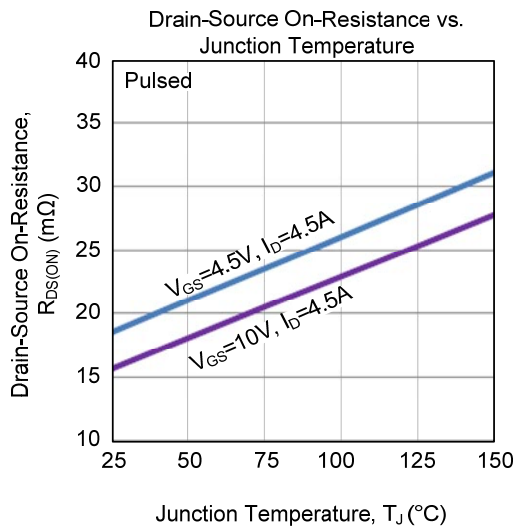
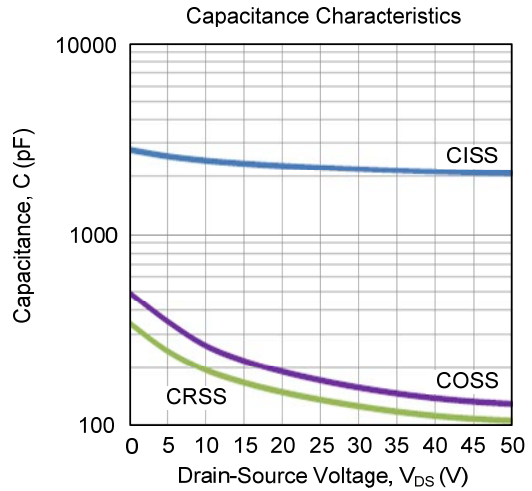
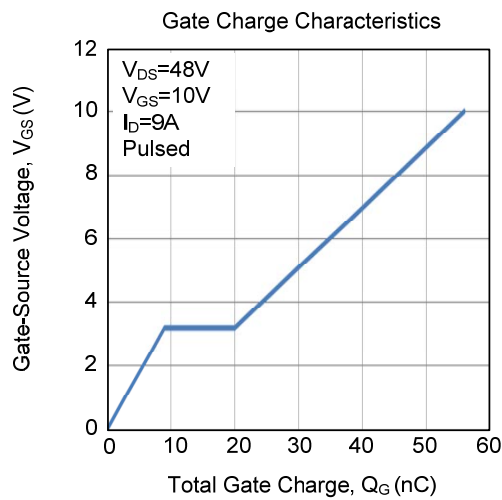
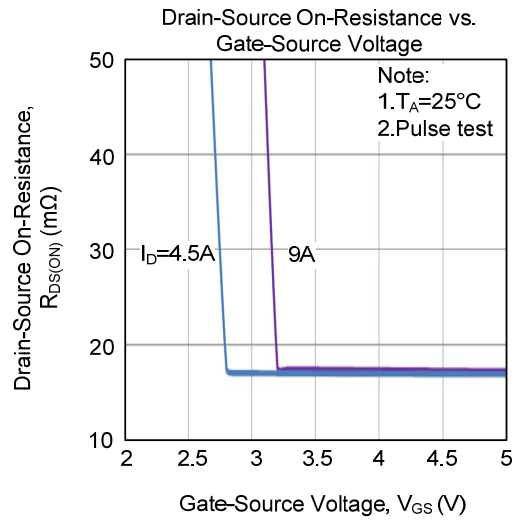
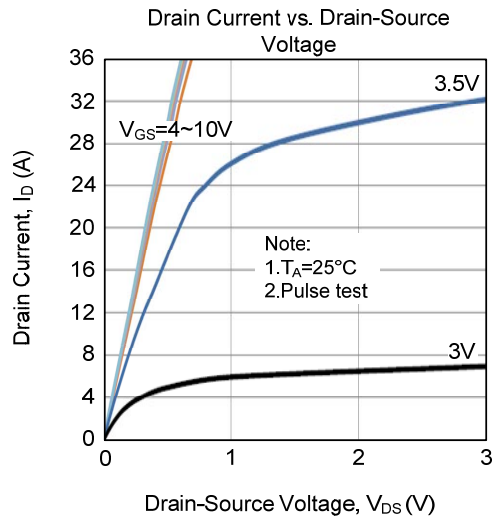
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

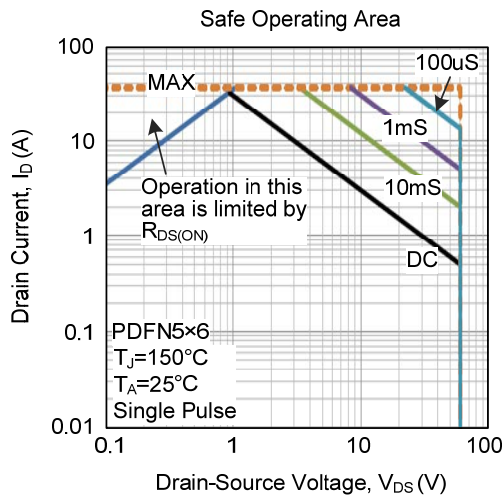
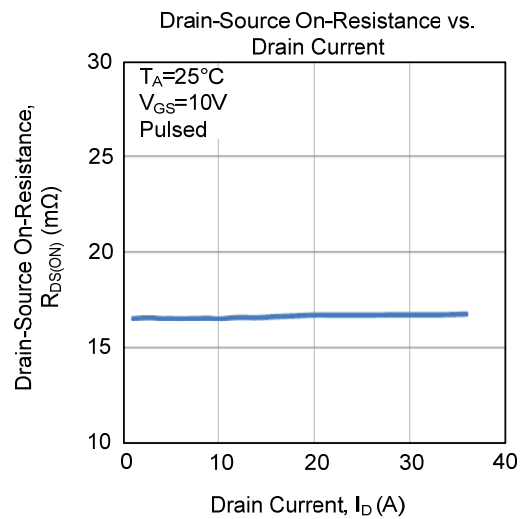
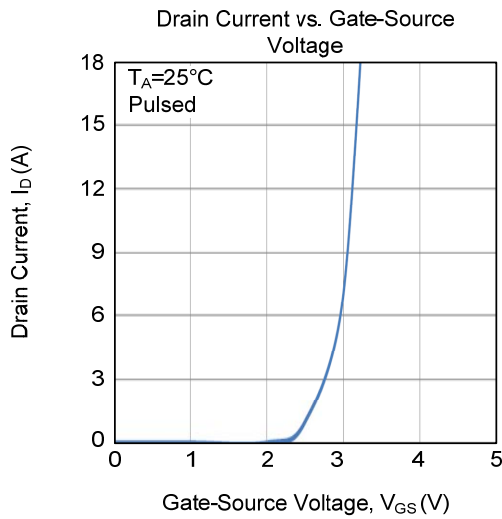
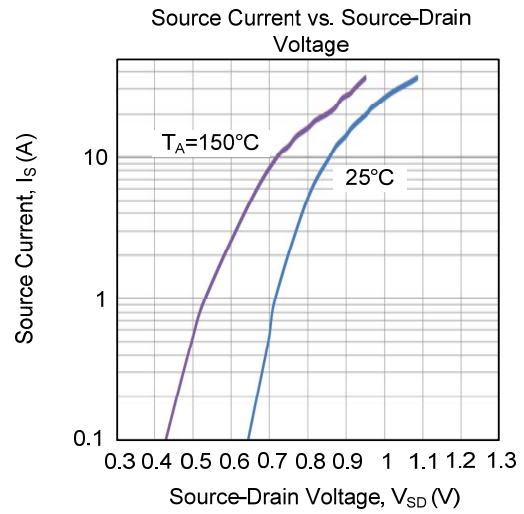
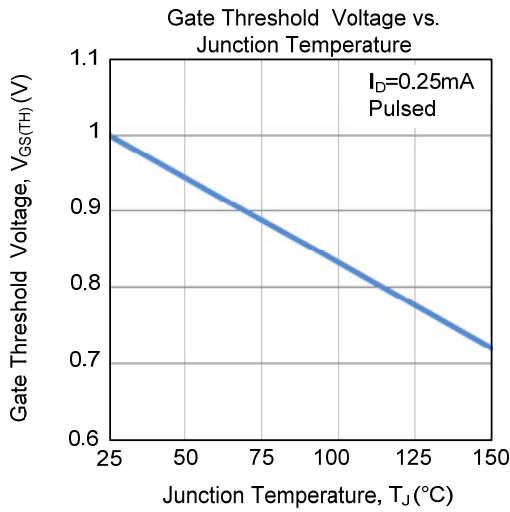
TYPICAL CHARACTERISTICS

N-CHANNEL



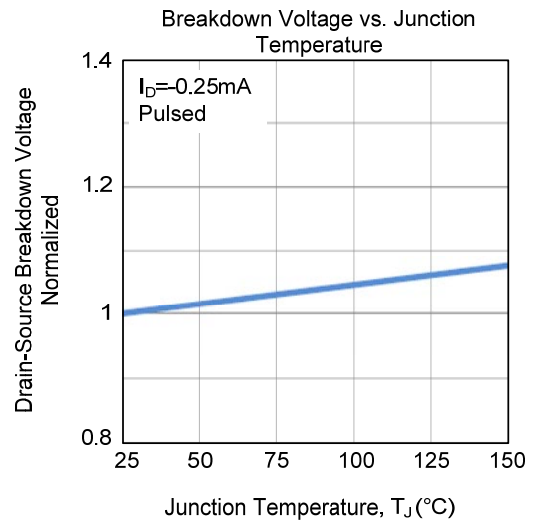
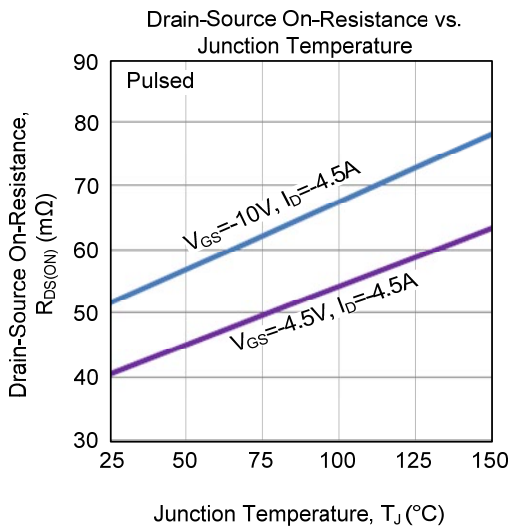
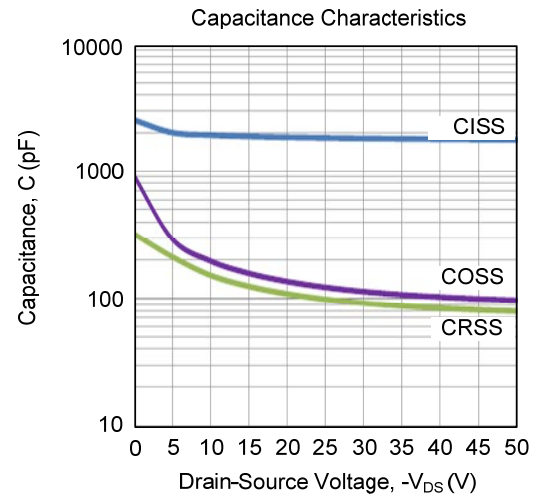
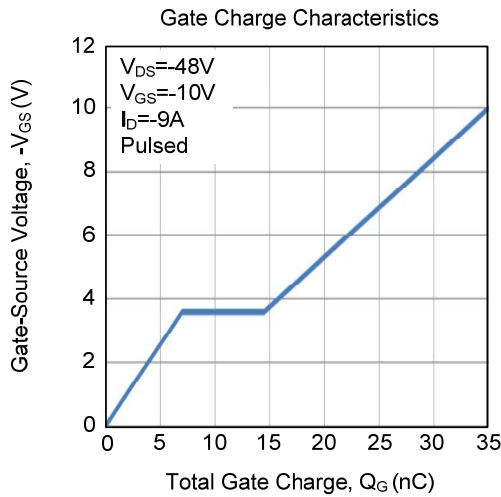
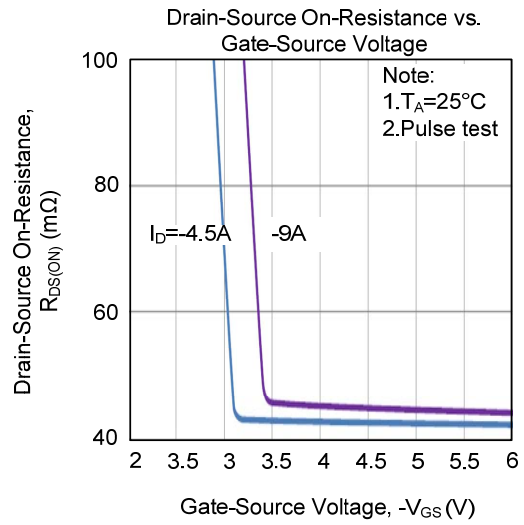
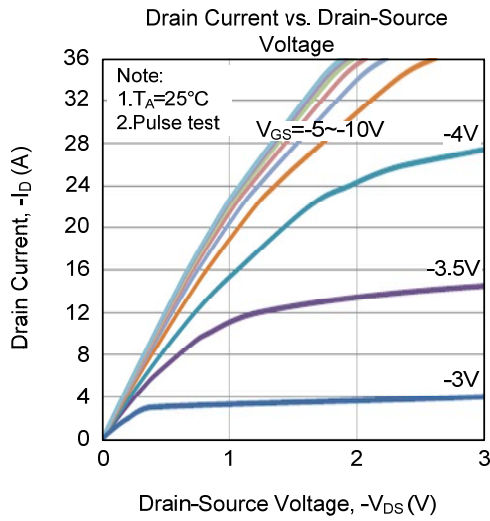
TYPICAL CHARACTERISTICS (Cont.)

N-CHANNEL



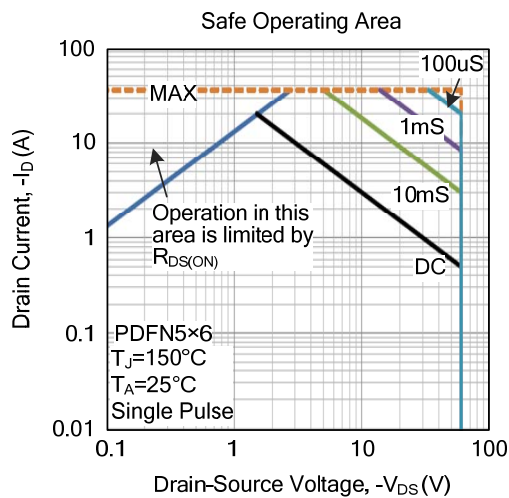
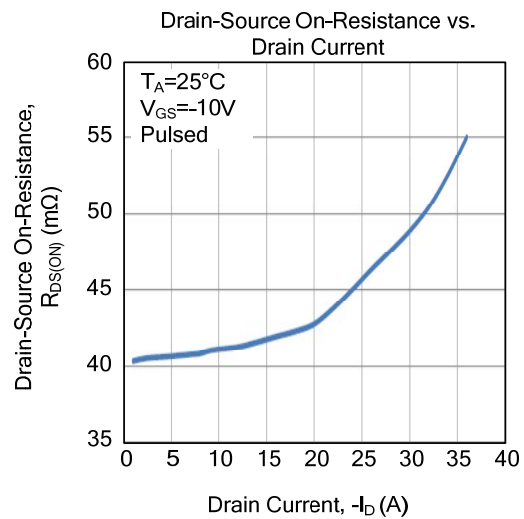
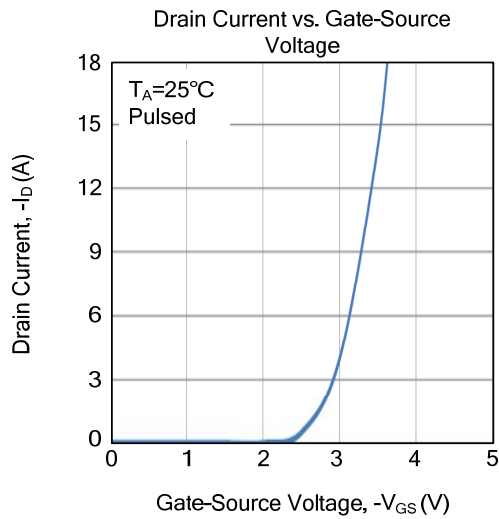
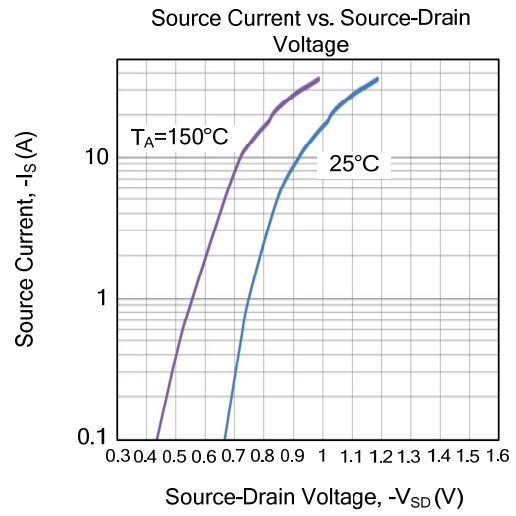
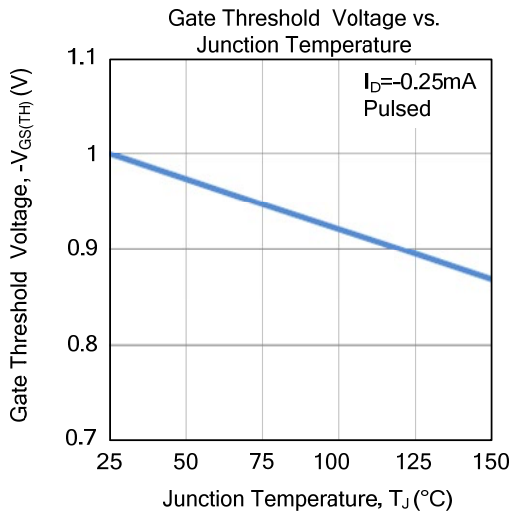
TYPICAL CHARACTERISTICS (Cont.)

P-CHANNEL

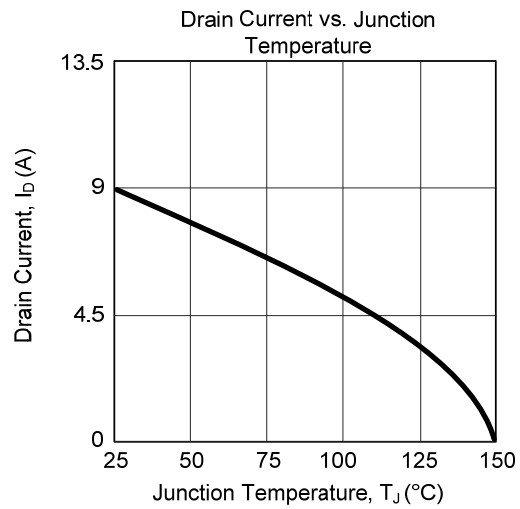
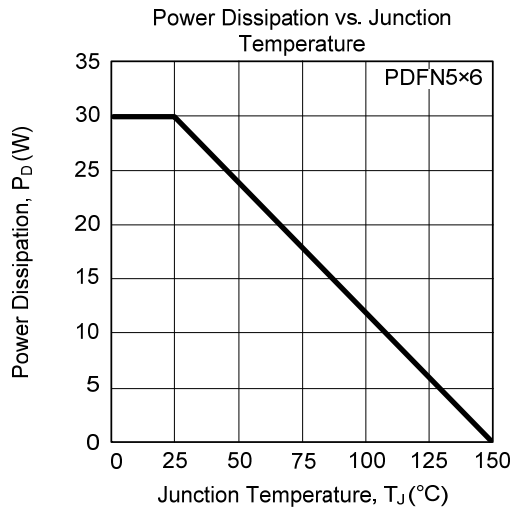


TYPICAL CHARACTERISTICS (Cont.)

P-CHANNEL



■ TYPICAL CHARACTERISTICS (Cont.)



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