



UTT10NP06

Power MOSFET

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

DESCRIPTION

The UTC **UTT10NP06** 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 **UTT10NP06** is universally applied in low voltage applications.

FEATURES

*N-CHANNEL

$$R_{DS(on)} \leq 56 \text{ m}\Omega @ V_{GS}=10V, I_D=5.0A$$

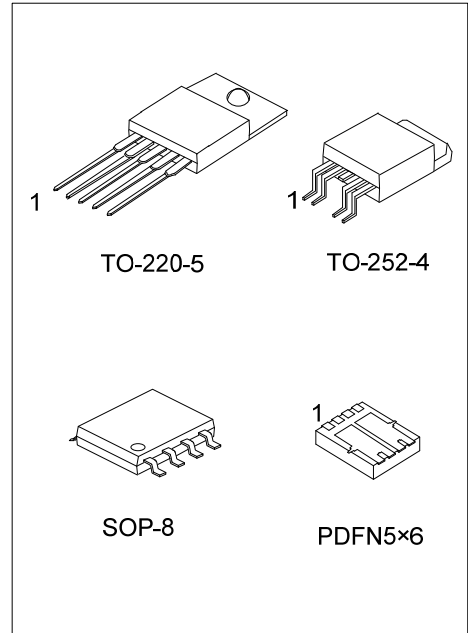
$$R_{DS(on)} \leq 64 \text{ m}\Omega @ V_{GS}=4.5V, I_D=5.0A$$

*P-CHANNEL

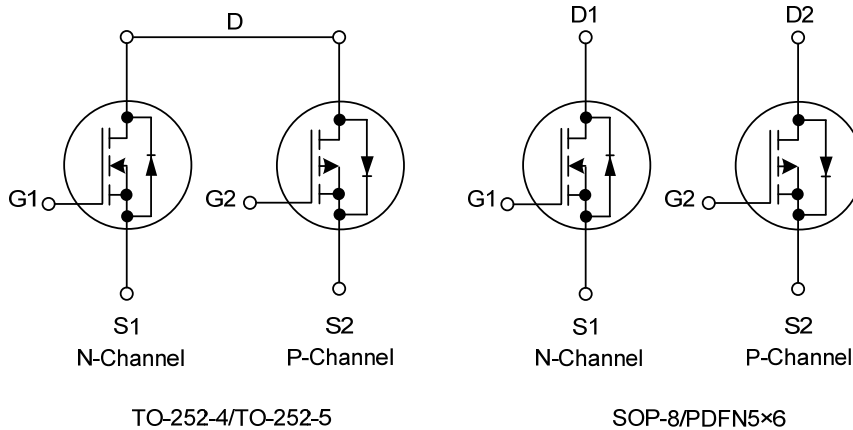
$$R_{DS(on)} \leq 68 \text{ m}\Omega @ V_{GS}=-10V, I_D=-5.0A$$

$$R_{DS(on)} \leq 88 \text{ m}\Omega @ V_{GS}=-4.5V, I_D=-5.0A$$

* High switching speed



SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT10NP06L-TA5-T	UTT10NP06G-TA5-T	TO-220-5	S1	G1	D	S2	G2	-	-	-	Tube
UTT10NP06L-TN4-R	UTT10NP06G-TN4-R	TO-252-4	S1	G1	D	S2	G2	-	-	-	Tape Reel
UTT10NP06L-S08-R	UTT10NP06G-S08-R	SOP-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel
UTT10NP06L-P5060-R	UTT10NP06G-P5060-R	PDFN5x6	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

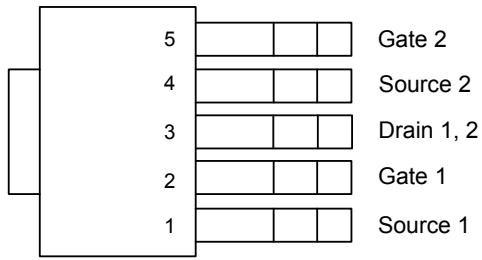
Note: Pin Assignment: G: Gate D: Drain S: Source

<p>UTT10NP06G-TA5-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA5: TO-220-5, TN4: TO-252-4, S08: SOP-8 P5060: PDFN5x6 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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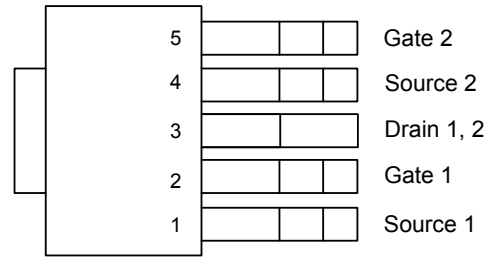
MARKING

PACKAGE	MARKING
TO-220-5 TO-252-4	<p>UTC UTT10NP06 Lot Code ← 1 → Date Code</p> <p>L: Lead Free G: Halogen Free</p>
SOP-8	<p>UTC UTT10NP06 Date Code Lot Code</p>
PDFN5x6	<p>UTC UTT 10NP06 Lot Code ← 1 → Date Code</p>

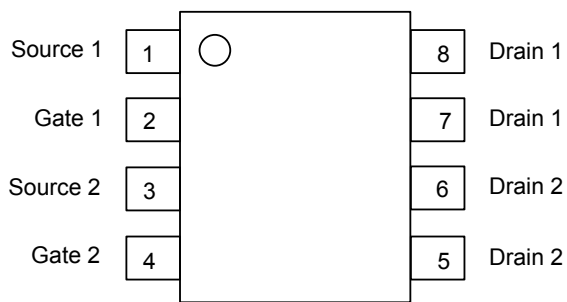
■ PIN CONFIGURATION



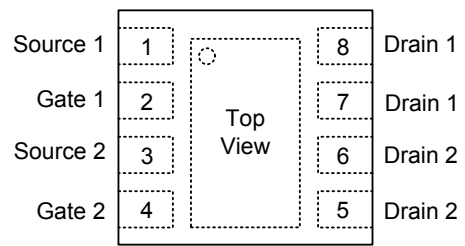
TO-220-5



TO-252-4



SOP-8



PDFN5x6

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER			SYMBOL	RATINGS		UNIT
				N-CHANNEL	P-CHANNEL	
Drain-Source Voltage			V_{DSS}	60	-60	V
Gate-Source Voltage			V_{GSS}	± 20	± 20	V
Drain Current	Continuous	$T_A=25^\circ\text{C}$	I_D	10	-10	A
	Pulsed (Note 2)		I_{DM}	20	-20	A
Avalanche Energy, Single Pulse (Note 3, 4)			E_{AS}	23	30.5	mJ
Power Dissipation	$T_A=25^\circ\text{C}$	TO-220-5	P_D	2		W
		TO-252-4				
		SOP-8		1.5		W
		PDFN5x6		1.9		W
Junction Temperature			T_J	-55 ~ +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. N-Channel: $L=0.1\text{mH}$, $I_{AS}=21.4\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. P-Channel: $L=0.1\text{mH}$, $I_{AS}=-24.6\text{A}$, $V_{DD}=-50\text{V}$, $R_G=25\Omega$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT		
Junction to Ambient	TO-220-5	θ_{JA}	62.5 (Note)	$^\circ\text{C/W}$		
	TO-252-4					
	SOP-8				100 (Note)	$^\circ\text{C/W}$
	PDFN5x6				65 (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			1	μA
Gate-Source Leakage Current	Forward	I _{GSS} V _{GS} =+20V V _{GS} =-20V			+100	nA
	Reverse				-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 =5.0A			56	mΩ
		V _{GS} =4.5V, I _D =5.0A			64	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		966.7		pF
Output Capacitance	C _{OSS}			80.3		pF
Reverse Transfer Capacitance	C _{RSS}			64.8		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note)	Q _G	V _{DS} =48V, V _{GS} =10V, I _D =10A, I _G =1mA (Note 1, 2)		28.7		nC
Gate to Source Charge	Q _{GS}			4		nC
Gate to Drain Charge	Q _{GD}			7.7		nC
Turn-ON Delay Time (Note)	t _{D(ON)}	V _{DS} =30V, V _{GS} =10V, I _D =10A, R _G =6Ω (Note 1, 2)		7.3		ns
Rise Time	t _R			16.2		ns
Turn-OFF Delay Time	t _{D(OFF)}			23.1		ns
Fall-Time	t _F			17.7		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage (Note)	V _{SD}	I _S =1.7A, V _{GS} =0V			1.2	V

■ ELECTRICAL CHARACTERISTICS (Cont.)

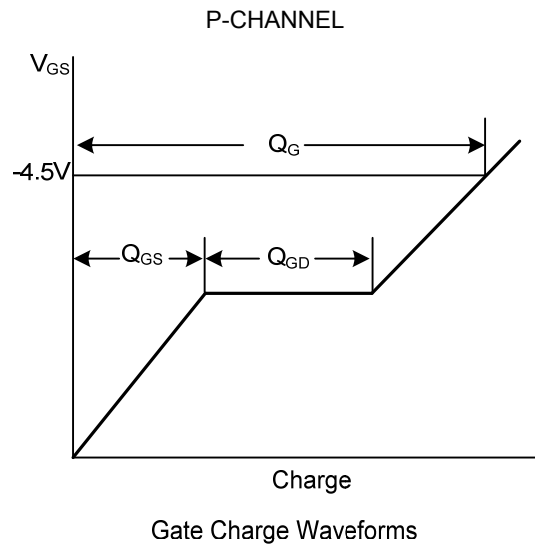
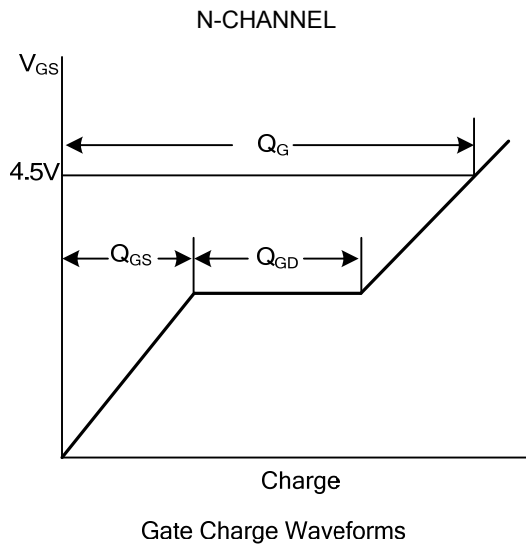
P-Channel

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}	$V_{DS} = -60V, V_{GS} = 0V$			-1	μA
Gate-Source Leakage Current	Forward	$V_{GS} = +20V$			+100	nA
	Reverse	$V_{GS} = -20V$			-100	nA
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)	$R_{DS(ON)}$	$V_{GS} = -10V, I_D = -5.0A$			68	m Ω
		$V_{GS} = -4.5V, I_D = -5.0A$			88	m Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS} = 0V, V_{DS} = -25V, f = 1.0MHz$		1587.7		pF
Output Capacitance	C_{OSS}			124		pF
Reverse Transfer Capacitance	C_{RSS}			110.1		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note)	Q_G	$V_{DS} = -48V, V_{GS} = -10V, I_D = -10A, I_G = -1mA$ (Note 1, 2)		41.5		nC
Gate to Source Charge	Q_{GS}			6.3		nC
Gate to Drain Charge	Q_{GD}			11		nC
Turn-ON Delay Time (Note)	$t_{D(ON)}$	$V_{DS} = -30V, V_{GS} = -10V, I_D = -10A, R_G = 6\Omega$ (Note 1, 2)		5.9		ns
Rise Time	t_R			17		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			49.5		ns
Fall-Time	t_F			27.7		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage (Note)	V_{SD}	$I_S = -1.7A, V_{GS} = 0V$			-1.2	V

Notes: 1. Essentially independent of operating temperature.

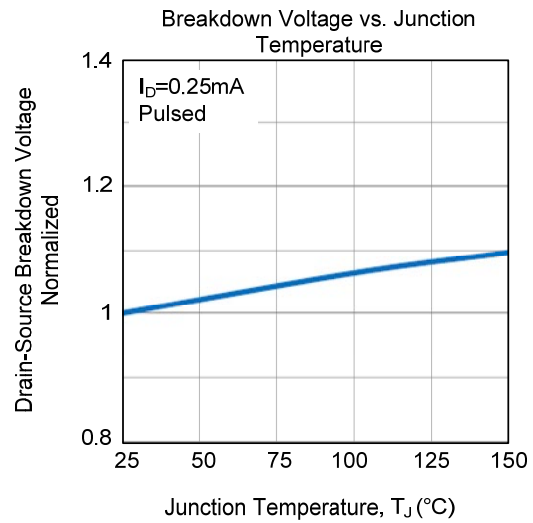
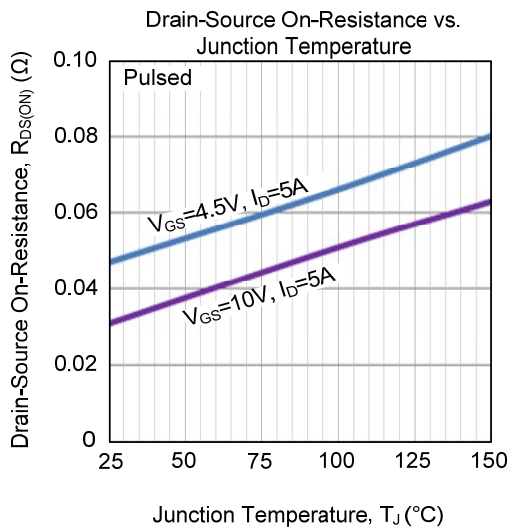
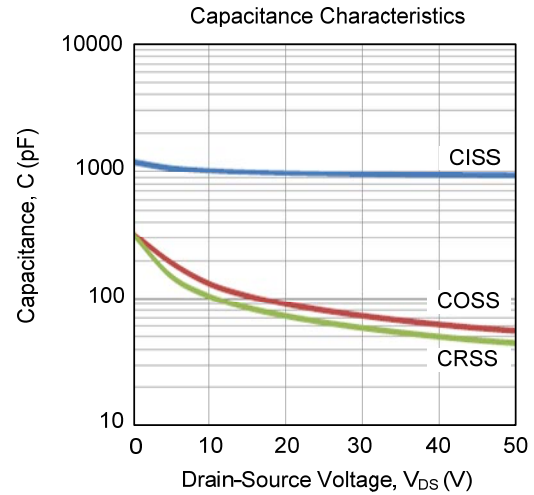
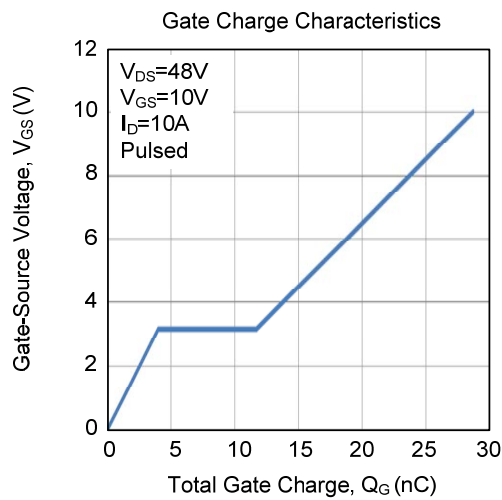
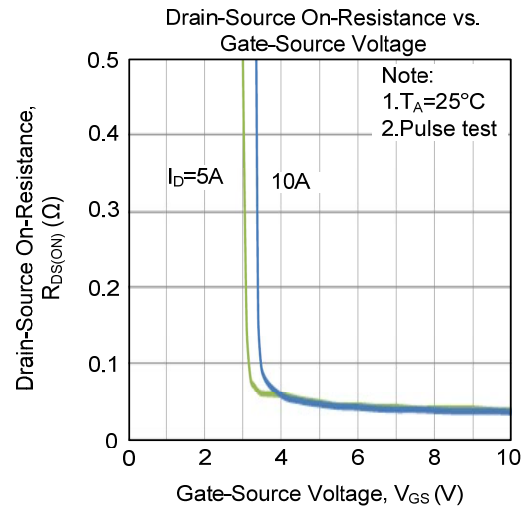
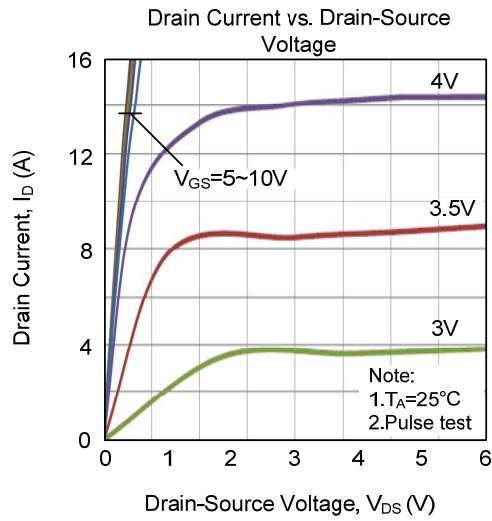
2. Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

■ TEST CIRCUITS AND WAVEFORMS



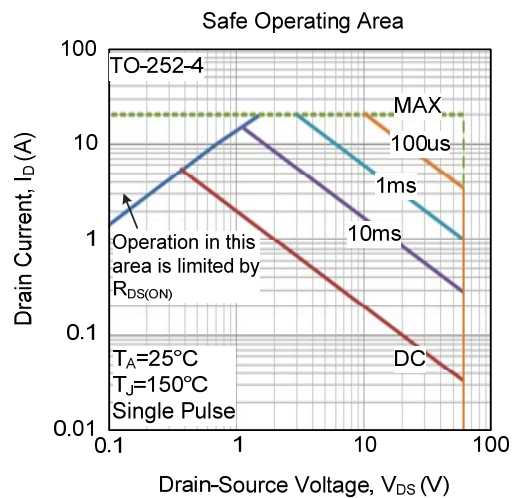
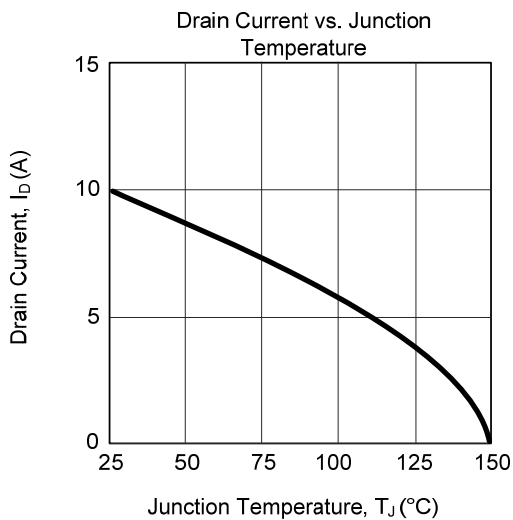
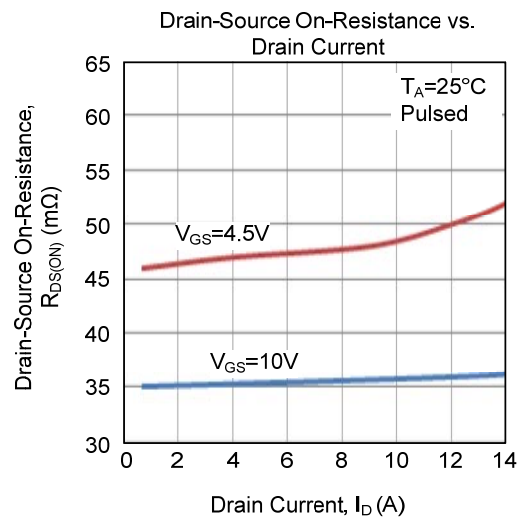
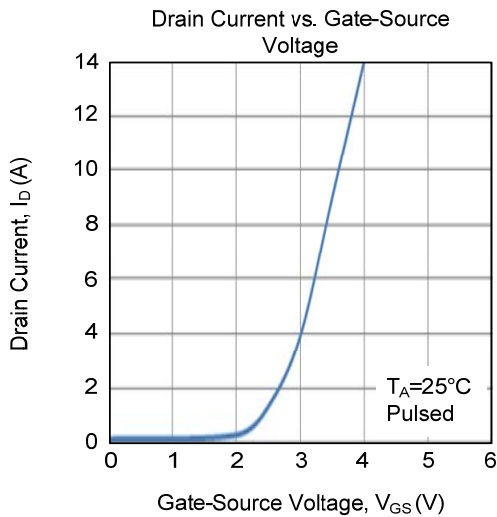
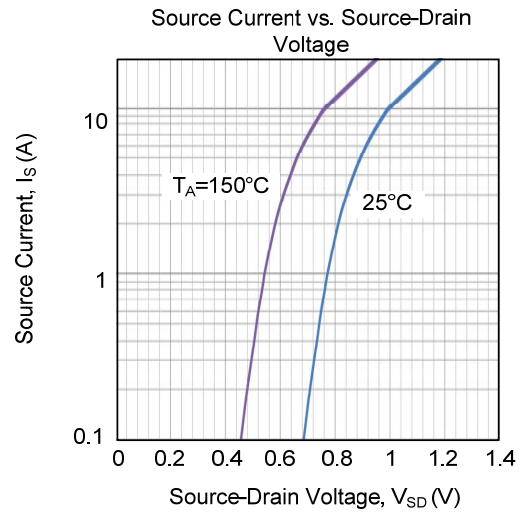
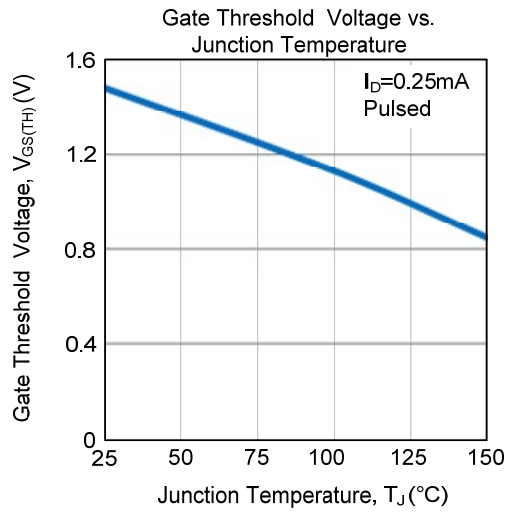
TYPICAL CHARACTERISTICS

N-CHANNEL



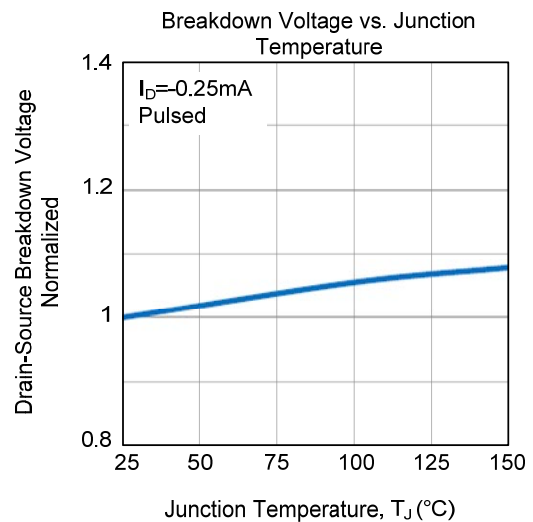
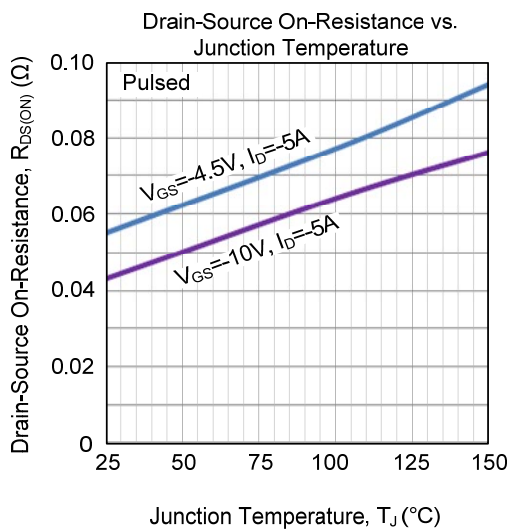
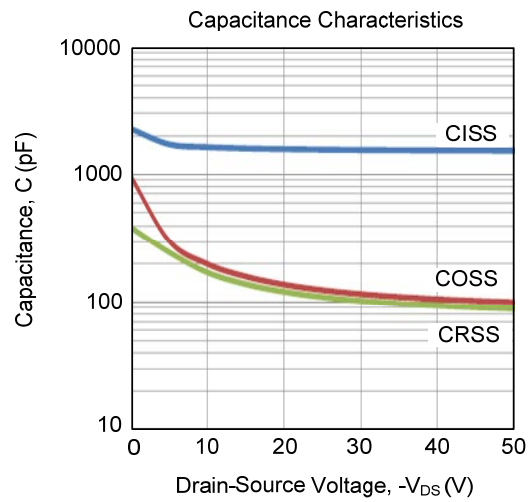
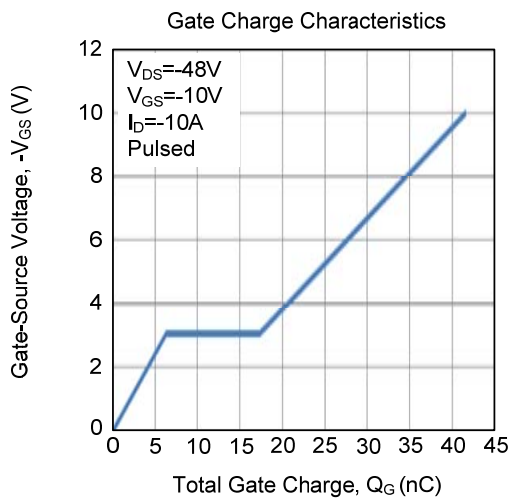
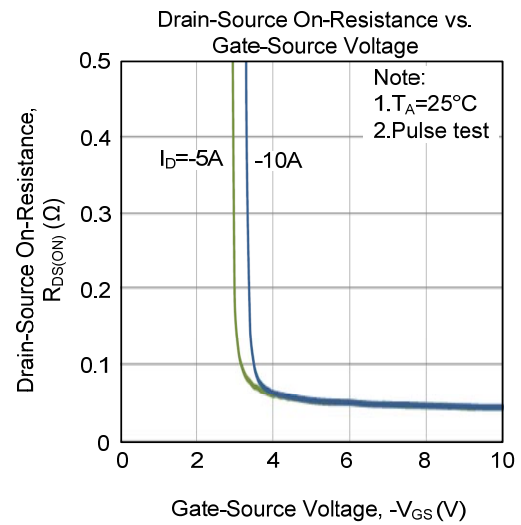
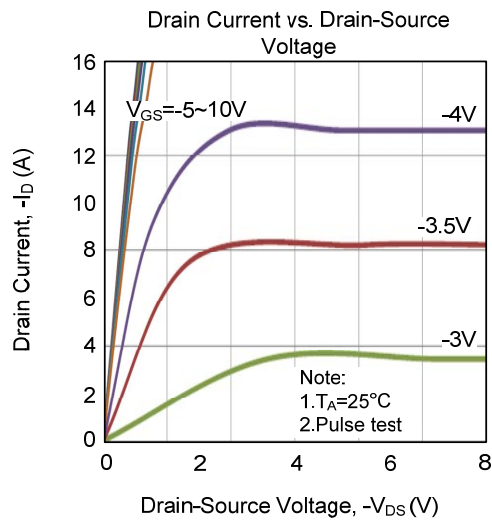
TYPICAL CHARACTERISTICS (Cont.)

N-CHANNEL



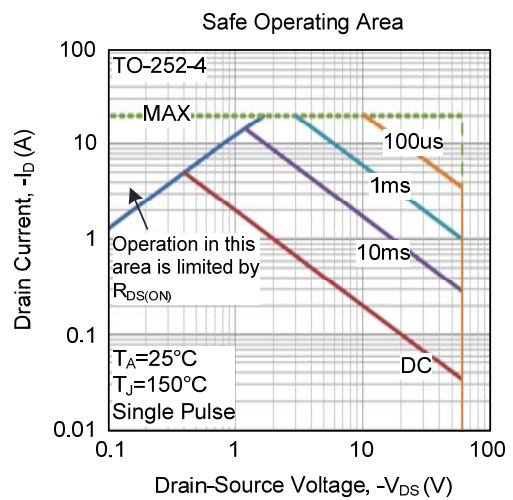
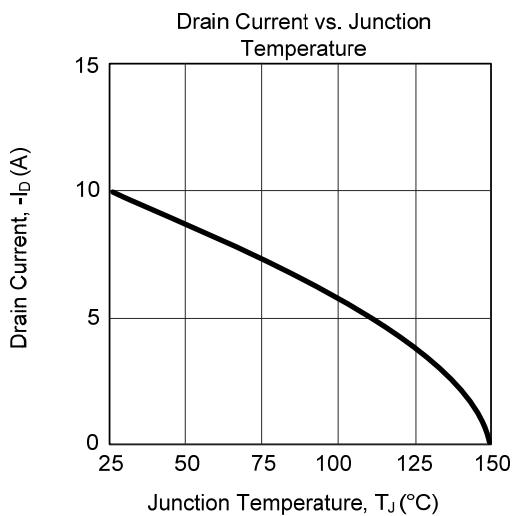
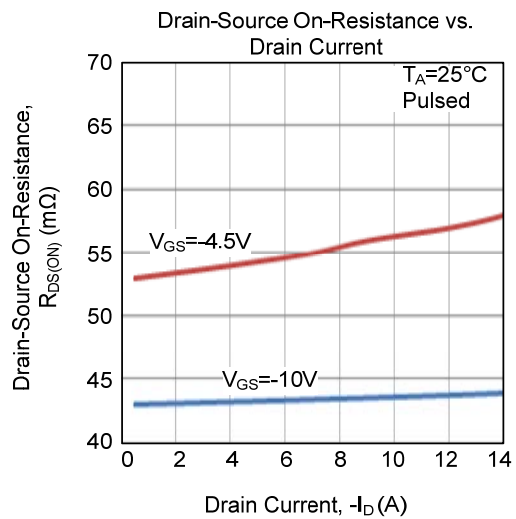
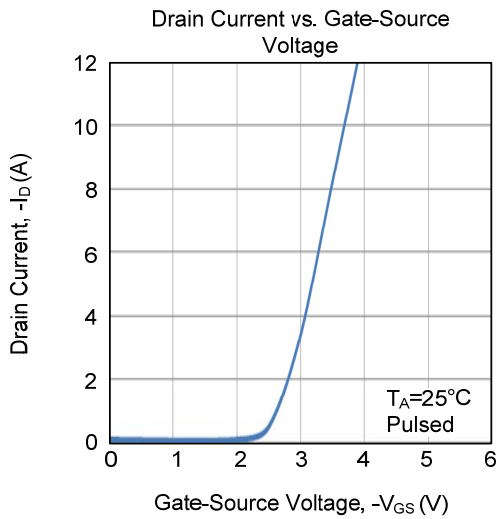
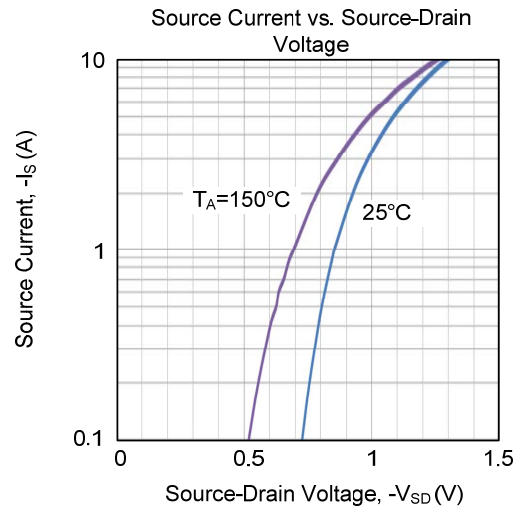
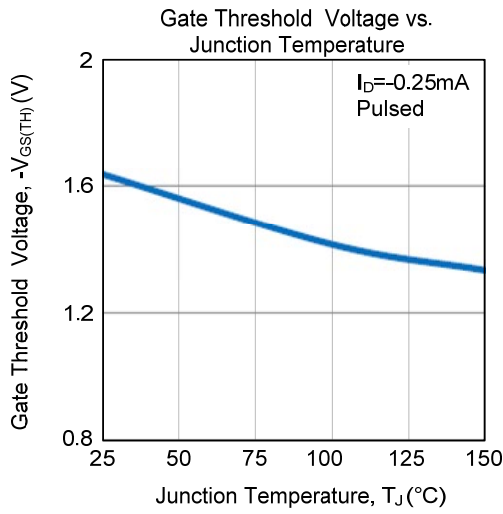
TYPICAL CHARACTERISTICS (Cont.)

P-CHANNEL

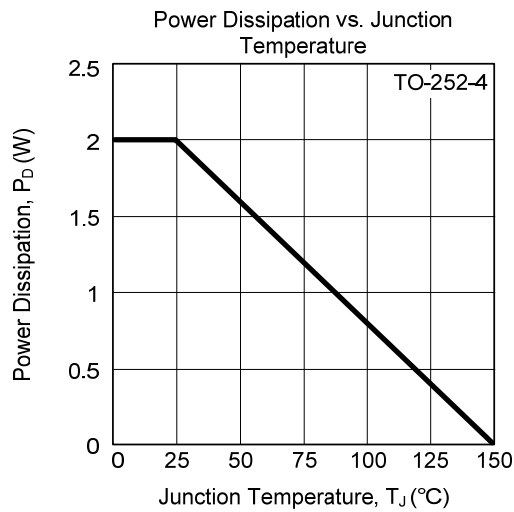


TYPICAL CHARACTERISTICS (Cont.)

P-CHANNEL



■ TYPICAL CHARACTERISTICS (Cont.)



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