

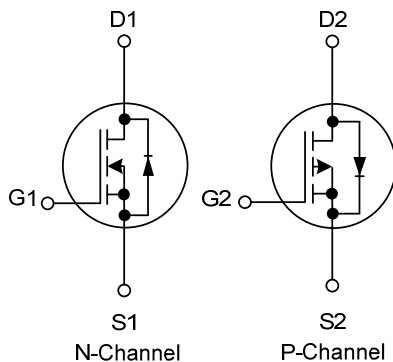
**UTT10NP06***Power MOSFET***DUAL ENHANCEMENT MODE
(N-CHANNEL / P-CHANNEL)****DESCRIPTION**

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**
 $R_{DS(on)} \leq 56 \text{ m}\Omega @ V_{GS}=10\text{V}, I_D=5.0\text{A}$
 $R_{DS(on)} \leq 64 \text{ m}\Omega @ V_{GS}=4.5\text{V}, I_D=5.0\text{A}$
***P-CHANNEL**
 $R_{DS(on)} \leq 68 \text{ m}\Omega @ V_{GS}=-10\text{V}, I_D=-5.0\text{A}$
 $R_{DS(on)} \leq 88 \text{ m}\Omega @ V_{GS}=-4.5\text{V}, I_D=-5.0\text{A}$

* High switching speed

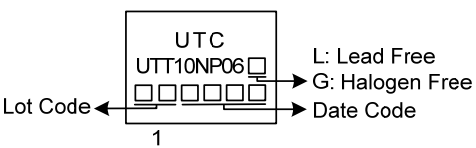
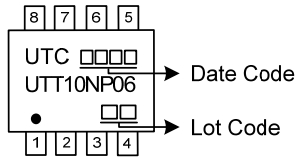
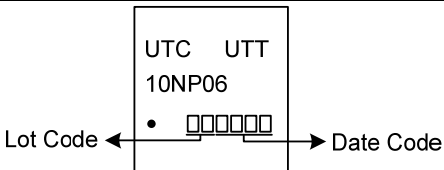
SYMBOL**ORDERING INFORMATION**

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	D1	D2	S2	G2	-	-	Tube
UTT10NP06L-TN4-R	UTT10NP06G-TN4-R	TO-252-4	S1	G1	D1	D2	S2	G2	-	-	Tape Reel
UTT10NP06L-S08-R	UTT10NP06G-S08-R	SOP-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel
UTT10NP06L-K08-5060-R	UTT10NP06G-K08-5060-R	DFN5060-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

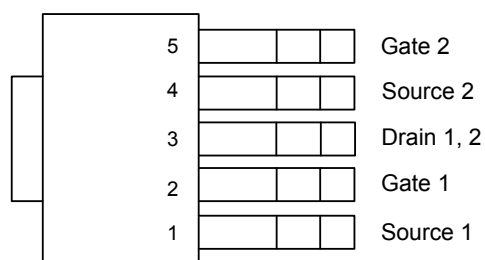
Note: Pin Assignment: G: Gate D: Drain S: Source

UTT10NP06G-TA5-T	(1)Packing Type	(1) T: Tube, R: Tape Reel
	(2)Package Type	(2) TA5:TO-220-5, TN4: TO-252-4, S08: SOP-8
	(3)Green Package	K08-5060: DFN5060-8
		(3) G: Halogen Free and Lead Free, L: Lead Free

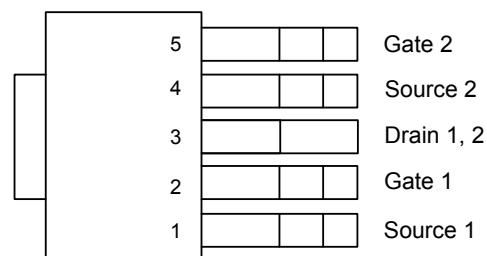
MARKING

PACKAGE	MARKING
TO-220-5 TO-252-4	
SOP-8	
DFN5060-8	

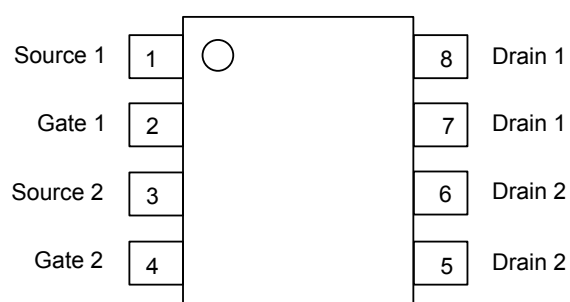
PIN CONFIGURATION



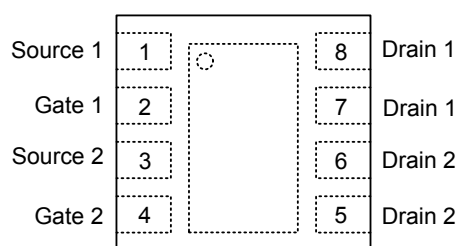
TO-220-5



TO-252-4



SOP-8



Top View
DFN5060-8

■ 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°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°C	TO-220-5	P _D	2		W
		TO-252-4				
		SOP-8		1.5		W
		DFN5060-8		1.9		W
Junction Temperature			T _J	-55 ~ +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. 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)	$^\circ\text{C/W}$
	DFN5060-8		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			+100	nA
	Reverse		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 =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		28.7		nC
Gate to Source Charge		Q _{GS}	(Note 1, 2)		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.)

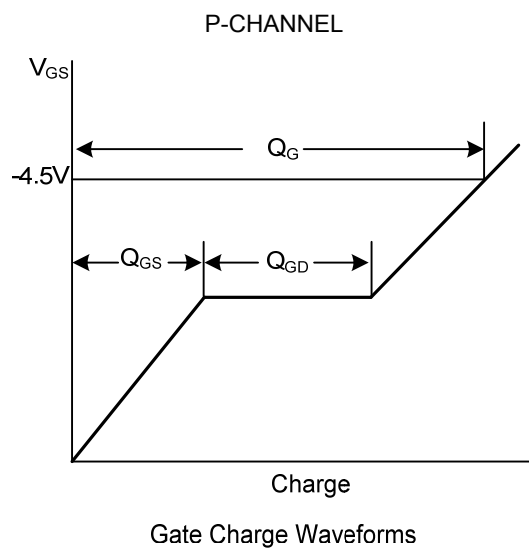
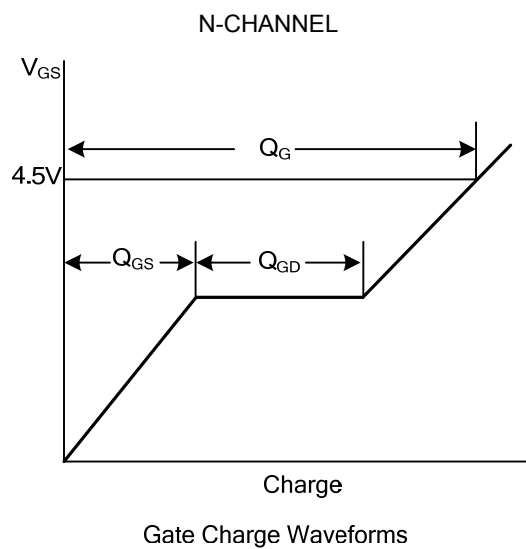
P-Channel

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =-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			+100	nA
	Reverse		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 =-5.0A			68	mΩ
			V _{GS} =-4.5V, I _D =-5.0A			88	mΩ
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		41.5		nC
Gate to Source Charge		Q _{GS}	(Note 1, 2)		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 =6Ω (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.

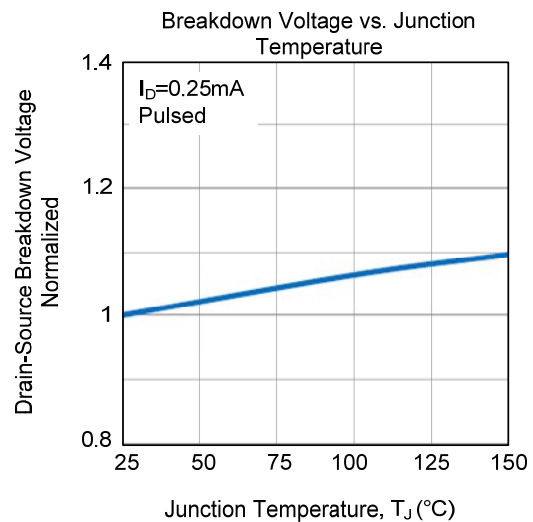
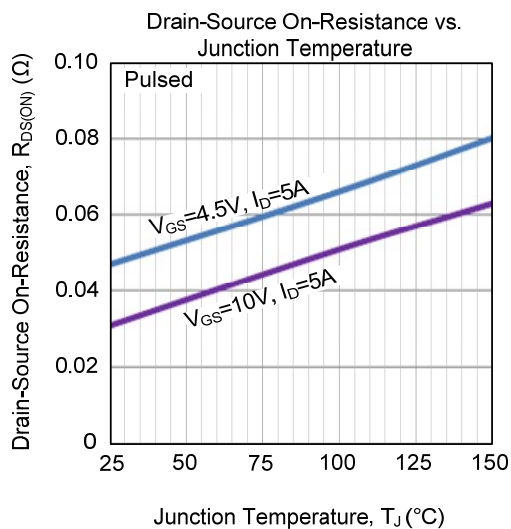
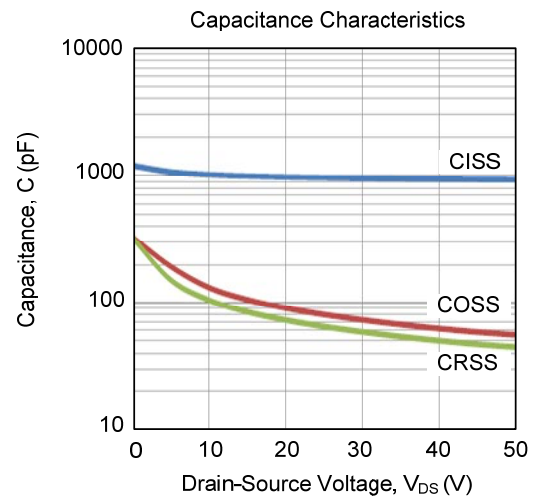
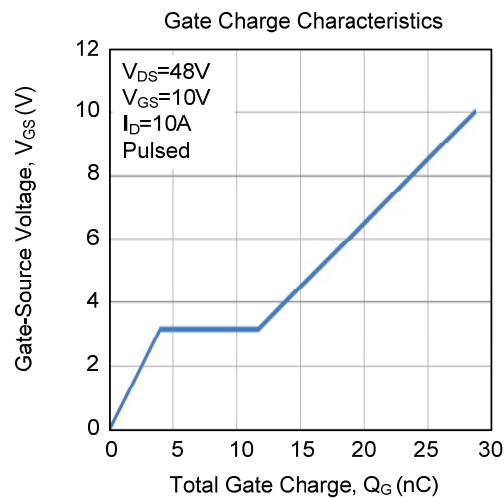
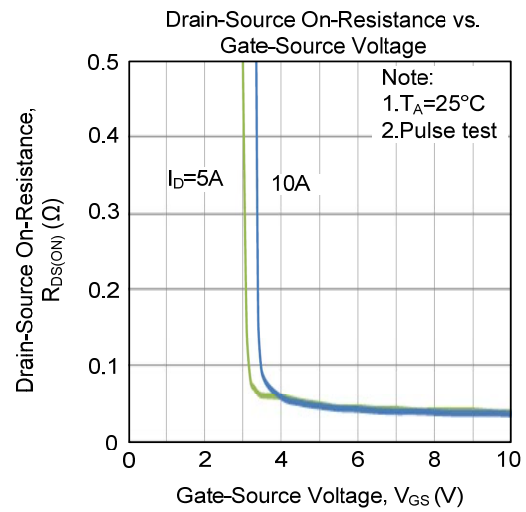
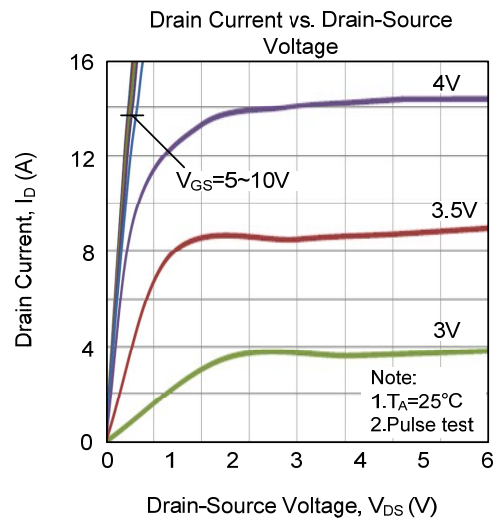
2. Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

■ TEST CIRCUITS AND WAVEFORMS



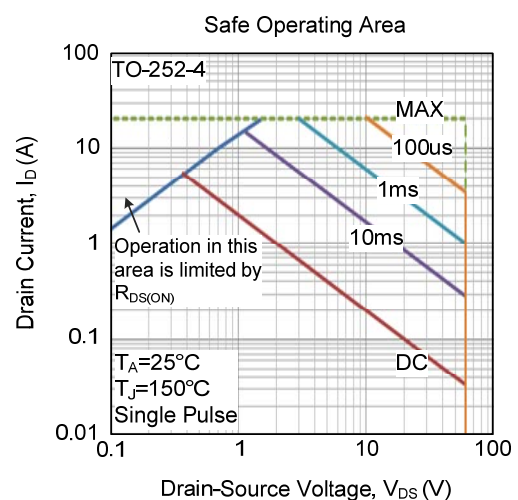
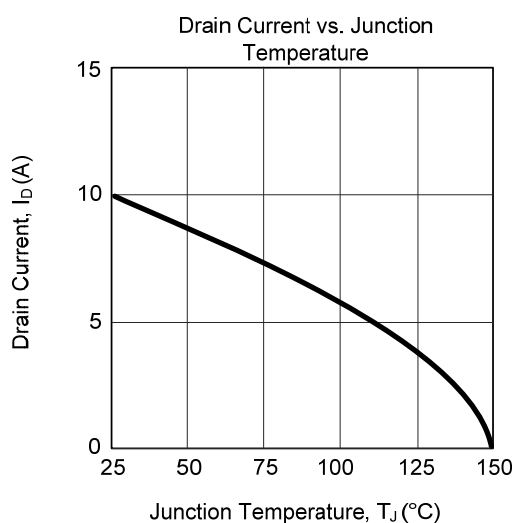
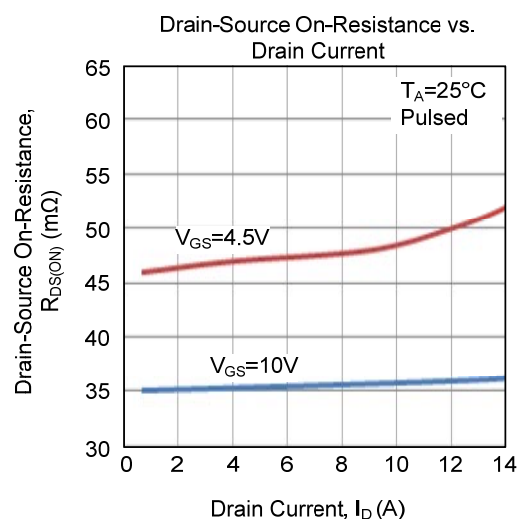
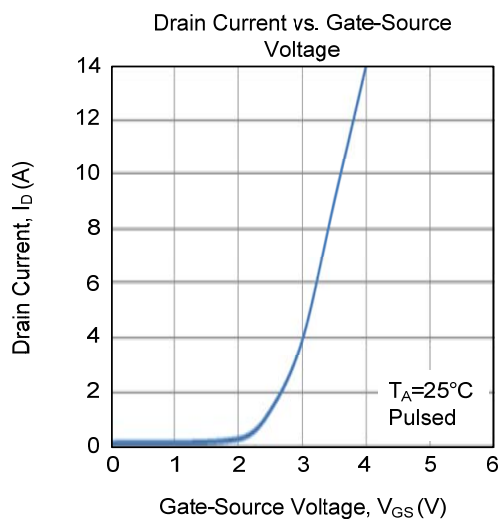
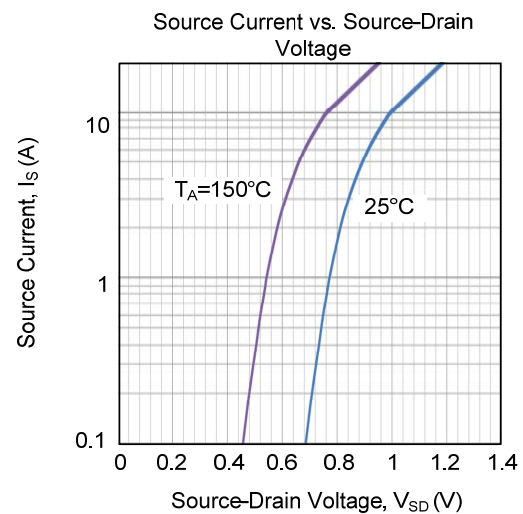
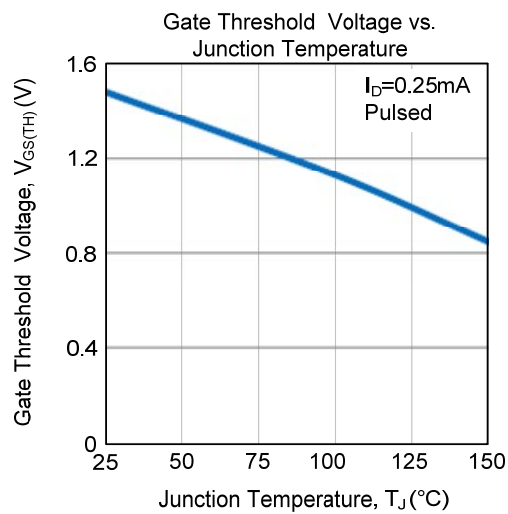
TYPICAL CHARACTERISTICS

N-CHANNEL



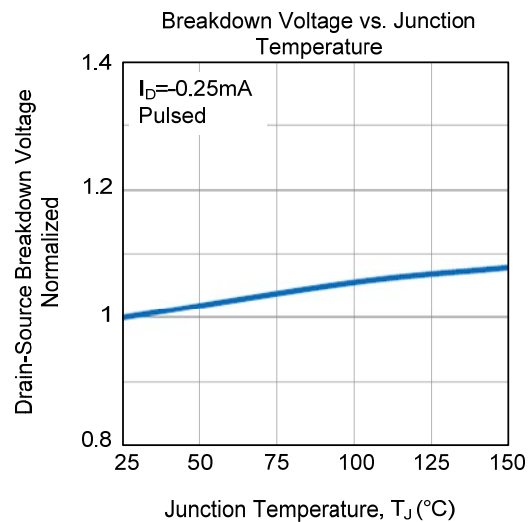
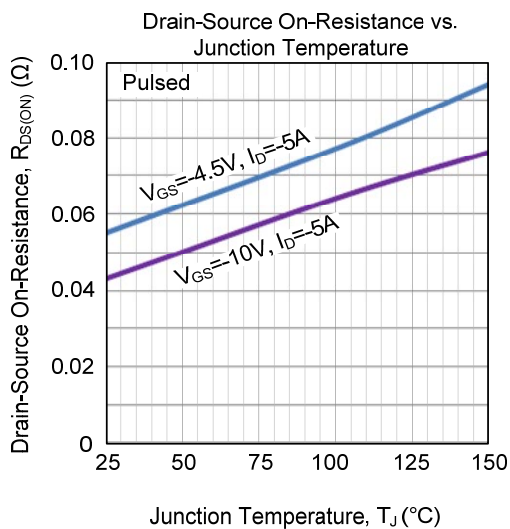
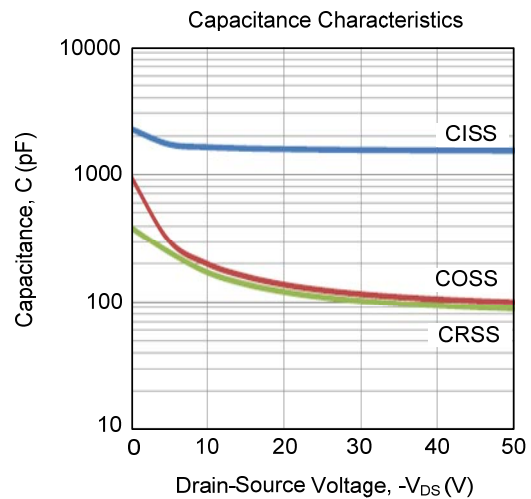
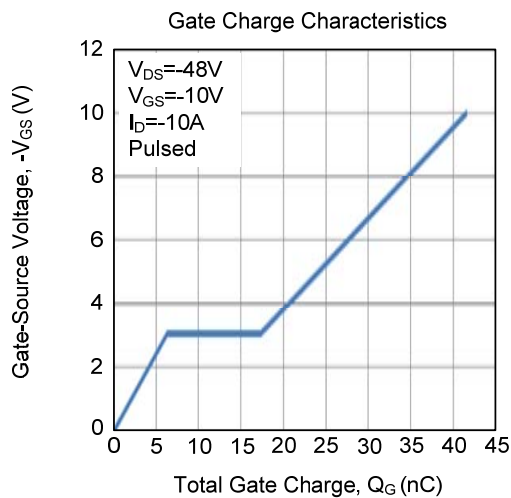
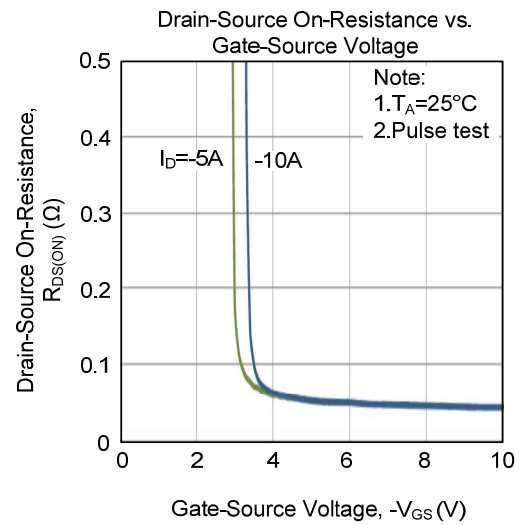
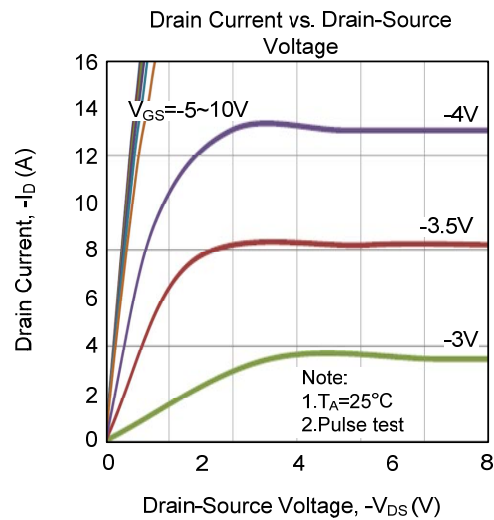
■ TYPICAL CHARACTERISTICS (Cont.)

N-CHANNEL



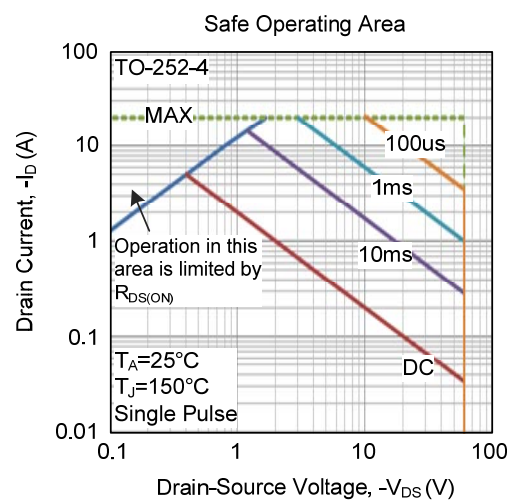
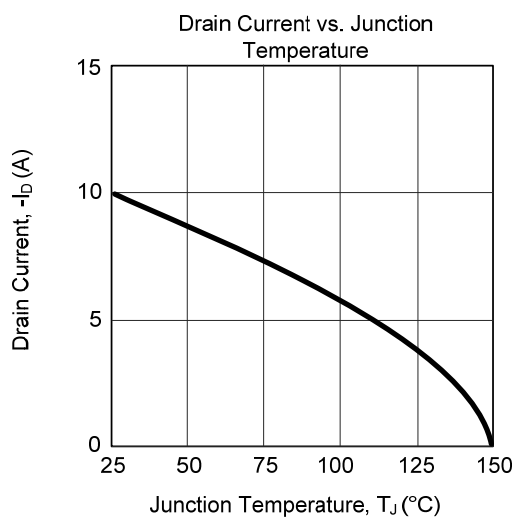
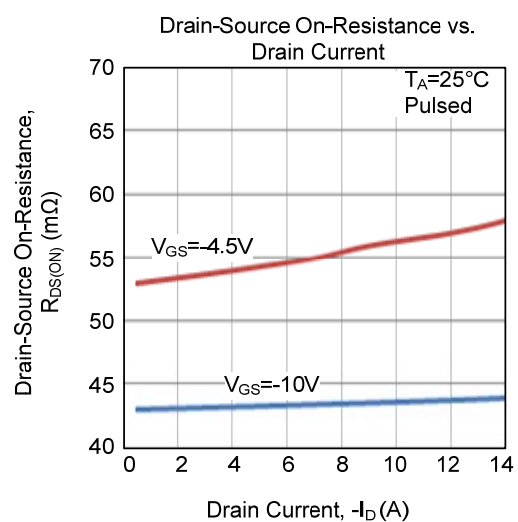
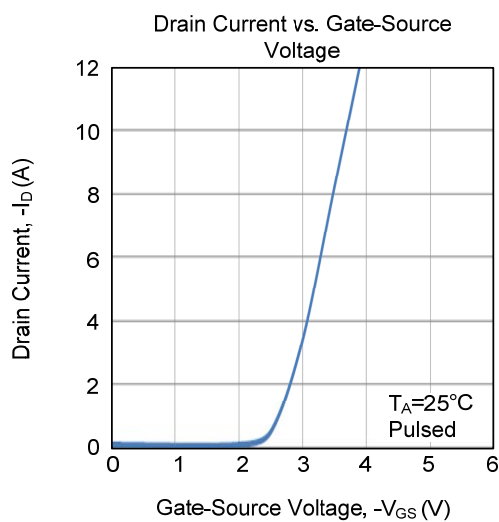
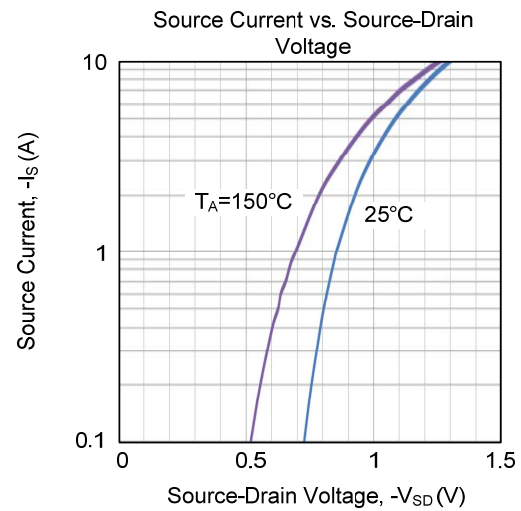
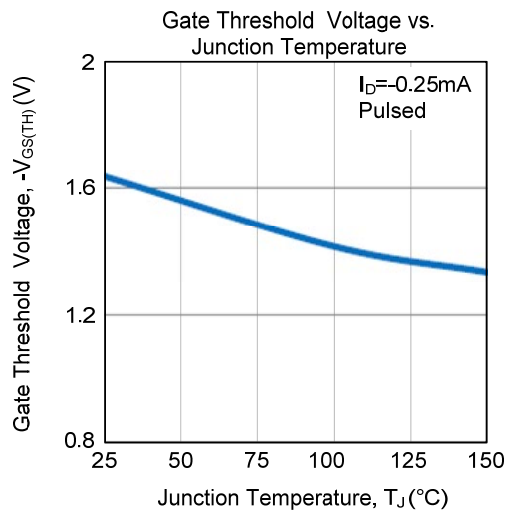
■ TYPICAL CHARACTERISTICS (Cont.)

P-CHANNEL

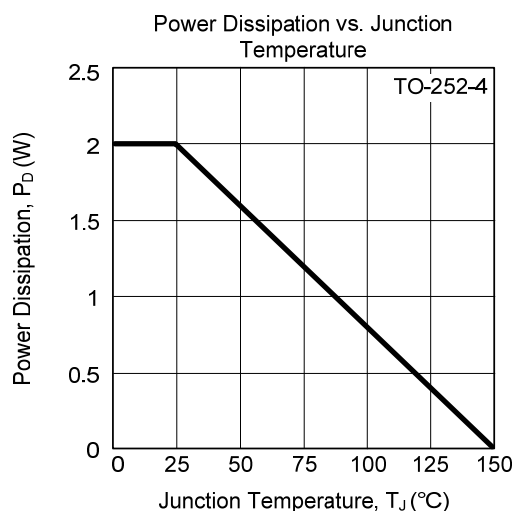


TYPICAL CHARACTERISTICS (Cont.)

P-CHANNEL



■ TYPICAL CHARACTERISTICS (Cont.)



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