



# UTT6NP10

*Power MOSFET*

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

■ DESCRIPTION

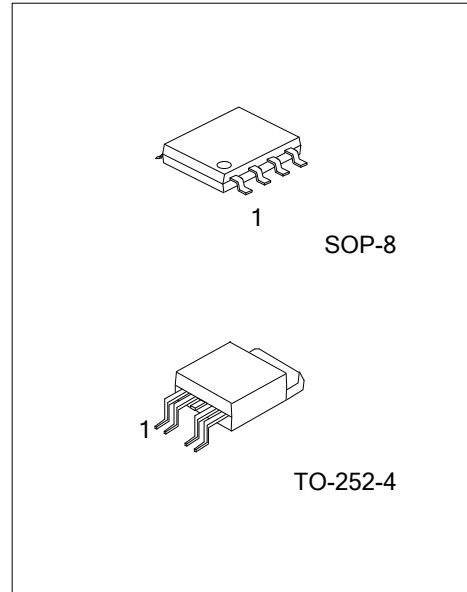
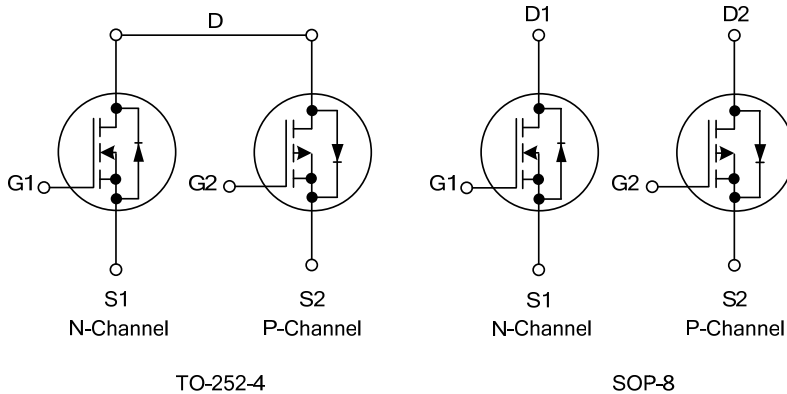
The UTC **UTT6NP10** incorporates an N-channel MOSFET and a P-channel MOSFET, it uses UTC's advanced technology to provide customers a minimum on-state resistance and high-speed switching, thereby enabling high-density mounting.

The UTC **UTT6NP10** is universally applied in high-speed switching, motor driver.

■ FEATURES

- \*  $R_{DS(on)} < 150m\Omega @ V_{GS} = 10V, I_D = 2A$
- $R_{DS(on)} < 250m\Omega @ V_{GS} = 5V, I_D = 1A$
- \*  $R_{DS(on)} < 155m\Omega @ V_{GS} = -10V, I_D = -2A$
- $R_{DS(on)} < 250m\Omega @ V_{GS} = -5V, I_D = -1A$
- \* High switching speed

■ SYMBOL



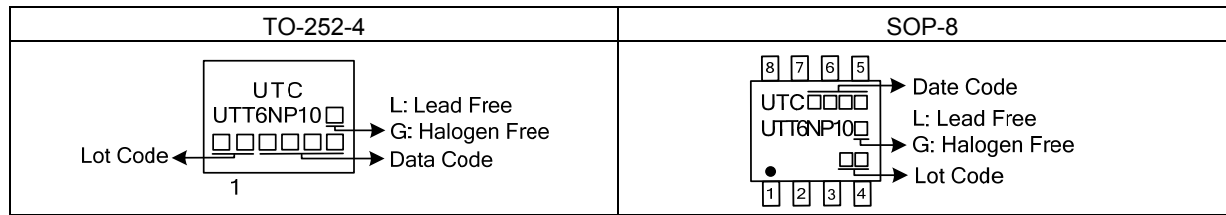
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT6NP10L-TN4-R	UTT6NP10G- TN4-R	TO-252-4	S1	G1	D	S2	G2	-	-	-	Tape Reel
UTT6NP10L- S08-R	UTT6NP10G- S08-R	SOP-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

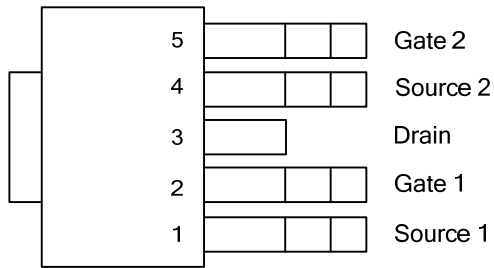
Note: Pin Assignel: G: Gate D: Drain S: Source

<p>UTT6NP10G-TN4-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) TN4: TO-252-4, S08: SOP-8</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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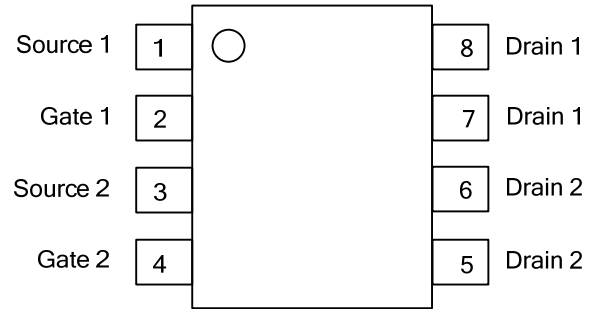
MARKING



PIN CONFIGURATION



TO-252-4



SOP-8

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

PARAMETER			SYMBOL	RATINGS		UNIT
				N-CHANNEL	P-CHANNEL	
Drain-Source Voltage			$V_{DSS}$	100	-100	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	$\pm 20$	V
Drain Current	Continuous (Note 3)	$T_A=25^\circ\text{C}$	$I_D$	3.1	-3.2	A
		$T_A=70^\circ\text{C}$		2.5	-2.5	A
	Pulsed (Note 1)		$I_{DM}$	12.4	-12.8	A
Power Dissipation ( $T_A=25^\circ\text{C}$ )			$P_D$	3.1		W
				2		W
Junction Temperature			$T_J$	-55~+150		$^\circ\text{C}$
Storage Temperature Range			$T_{STG}$	-55~+150		$^\circ\text{C}$

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-252-4			
	SOP-8	62.5	$^\circ\text{C/W}$	

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

**N-channel**

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage		$BV_{DSS}$	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	100			V
Drain-Source Leakage Current		$I_{DSS}$	$V_{DS}=80\text{V}, V_{GS}=0\text{V}$			10	$\mu\text{A}$
Gate-Source Leakage Current	Forward	$I_{GSS}$	$V_{GS}=+20\text{V}$			+100	nA
	Reverse		$V_{GS}=-20\text{V}$			-100	nA
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1		3	V
Static Drain-Source On-State Resistance (Note 2)		$R_{DS(ON)}$	$V_{GS}=10\text{V}, I_D=2\text{A}$			150	m $\Omega$
			$V_{GS}=5\text{V}, I_D=1\text{A}$			250	m $\Omega$
<b>DYNAMIC PARAMETERS</b>							
Input Capacitance		$C_{ISS}$	$V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1.0\text{MHz}$		530		pF
Output Capacitance		$C_{OSS}$			45		pF
Reverse Transfer Capacitance		$C_{RSS}$			35		pF
<b>SWITCHING PARAMETERS</b>							
Total Gate Charge (Note 2)		$Q_G$	$V_{GS}=10\text{V}, V_{DS}=80\text{V}, I_D=3.1\text{A}$		95		nC
Gate to Source Charge		$Q_{GS}$			3.2		nC
Gate to Drain Charge		$Q_{GD}$			3		nC
Turn-ON Delay Time (Note 2)		$t_{D(ON)}$	$V_{DS}=50\text{V}, I_D=3.1\text{A}$ $V_{GS}=10\text{V}, R_G=3.3\Omega$		40		ns
Rise Time		$t_R$			30		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			150		ns
Fall-Time		$t_F$			45		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Drain-Source Diode Forward Voltage(Note 2)		$V_{SD}$	$I_S=3.1\text{A}, V_{GS}=0\text{V}$			1.3	V

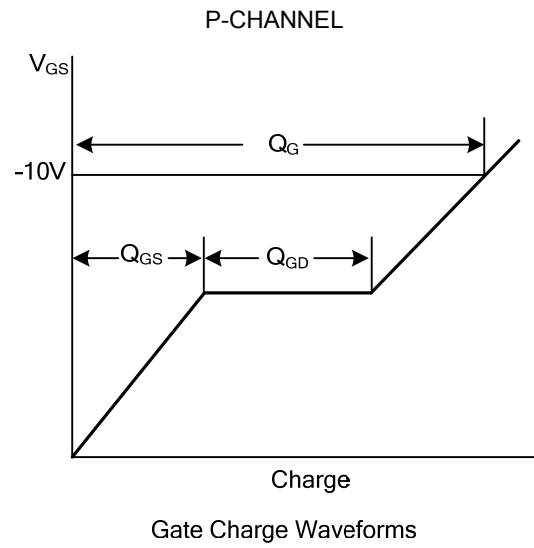
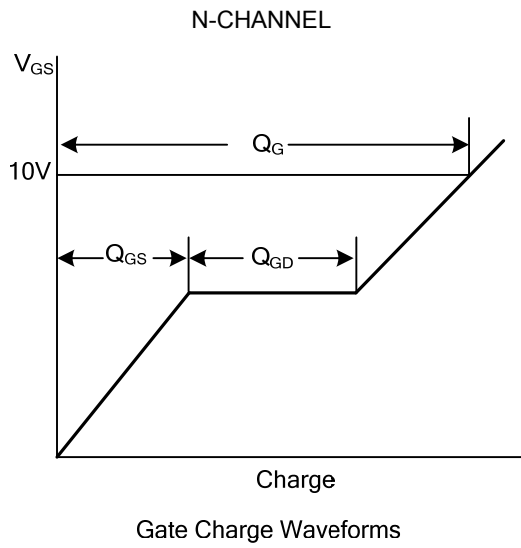
### ■ ELECTRICAL CHARACTERISTICS(Cont.)

#### P-Channel

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=-250\mu A, V_{GS}=0V$	-100			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-80V, V_{GS}=0V$			-10	$\mu A$
Gate-Source Leakage Current	Forward	$V_{GS}=+20V, V_{DS}=0V$			+100	nA
	Reverse	$V_{GS}=-20V, V_{DS}=0V$			-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1		-3	V
Static Drain-Source On-State Resistance (Note 2)	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-2A$			155	m $\Omega$
		$V_{GS}=-5V, I_D=-1A$			250	m $\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0V, V_{DS}=-25V, f=1.0MHz$		1400	2240	pF
Output Capacitance	$C_{OSS}$			110		pF
Reverse Transfer Capacitance	$C_{RSS}$			70		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge (Note 2)	$Q_G$	$V_{GS}=-10V, V_{DS}=-80V, I_D=-3.2A$		140		nC
Gate to Source Charge	$Q_{GS}$			7		nC
Gate to Drain Charge	$Q_{GD}$			6		nC
Turn-ON Delay Time (Note 2)	$t_{D(ON)}$	$V_{DS}=-50V, I_D=-3.2A$ $V_{GS}=-10V, R_G=3.3\Omega$		46		ns
Rise Time	$t_R$			51		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			300		ns
Fall-Time	$t_F$			250		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage(Note 2)	$V_{SD}$	$I_S=-3.2A, V_{GS}=0V$			-1.3	V

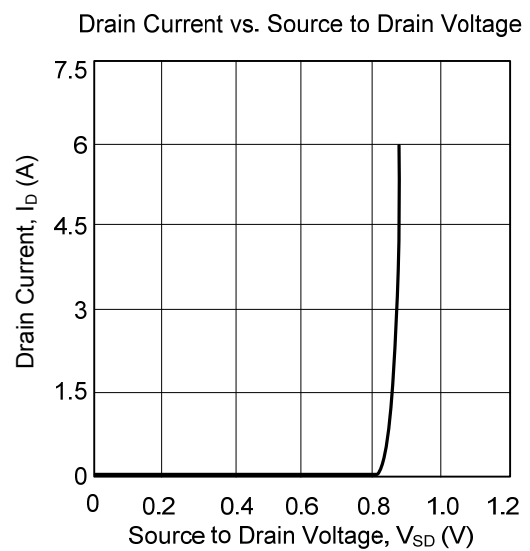
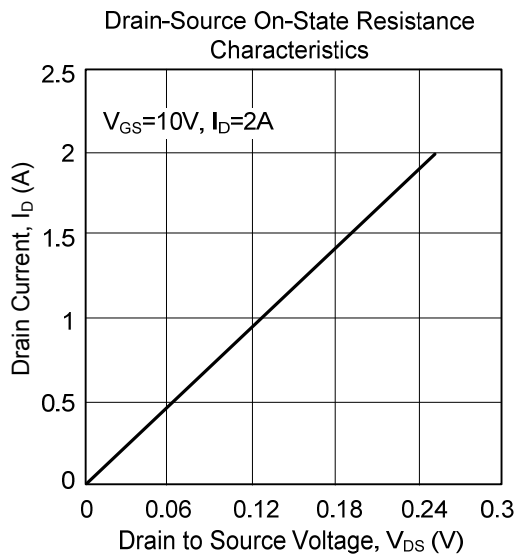
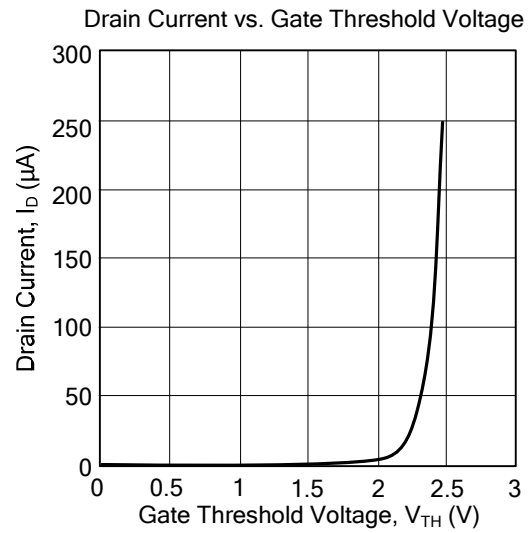
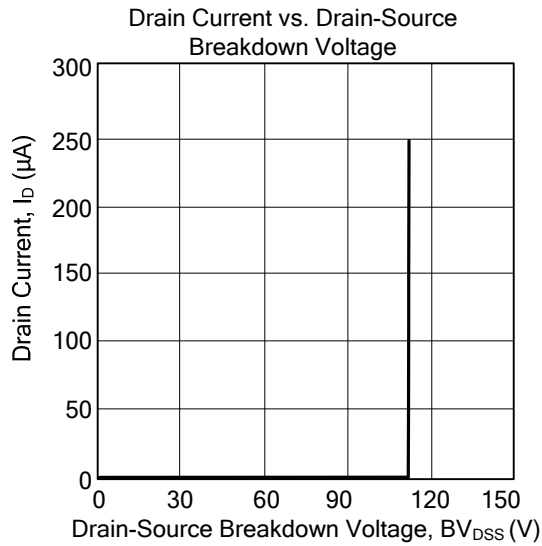
- Notes: 1. Pulse Test: Pulse width limited by Max. junction temperature.  
 2. N-CH, P-CH are same, mounted on 2oz FR4 board  $t \leq 10s$ .

## ■ TEST CIRCUITS AND WAVEFORMS



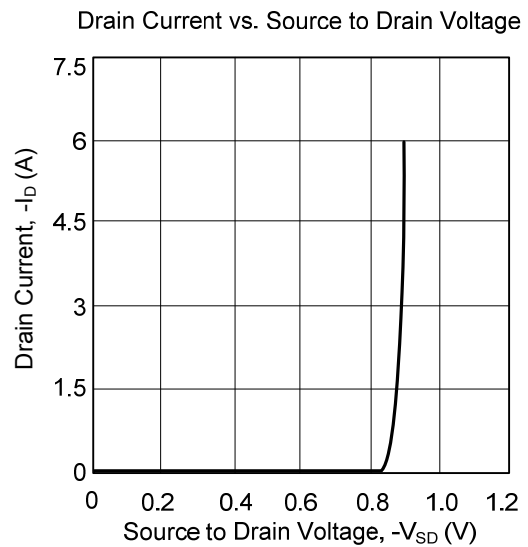
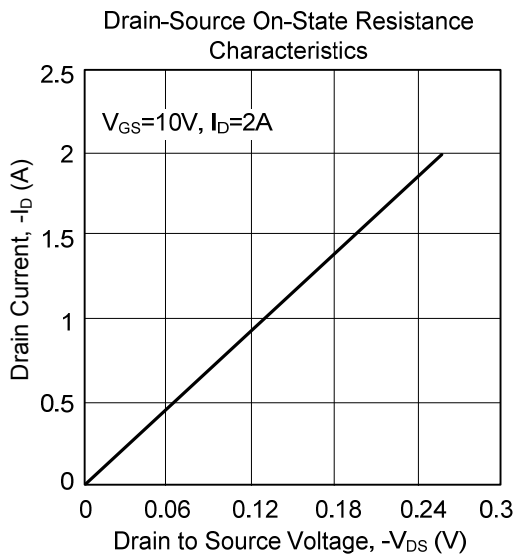
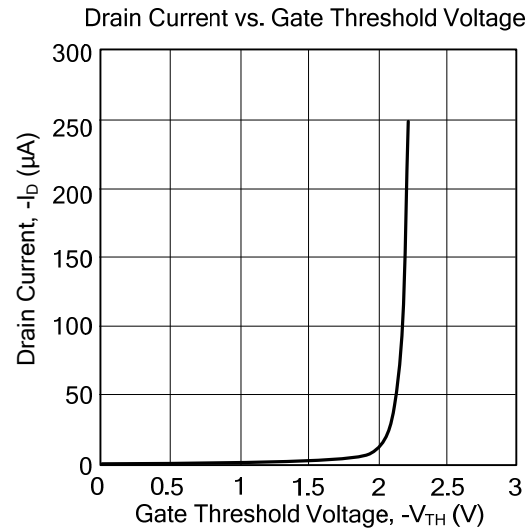
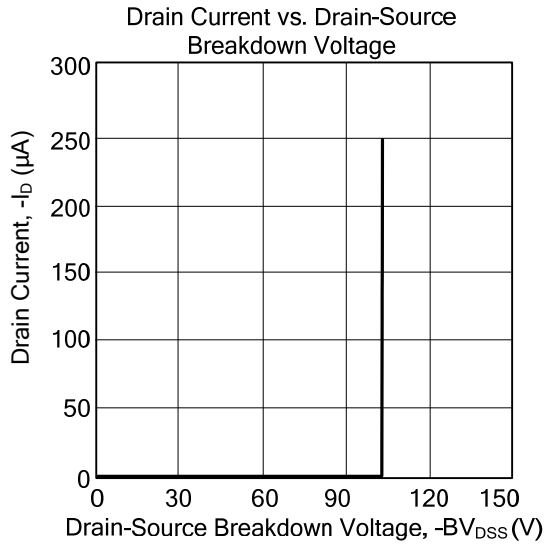
### ■ TYPICAL CHARACTERISTICS

N-channel



### ■ TYPICAL CHARACTERISTICS(Cont.)

P-channel



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