



UTD413

Power MOSFET

P-CHANNEL ENHANCEMENT MODE

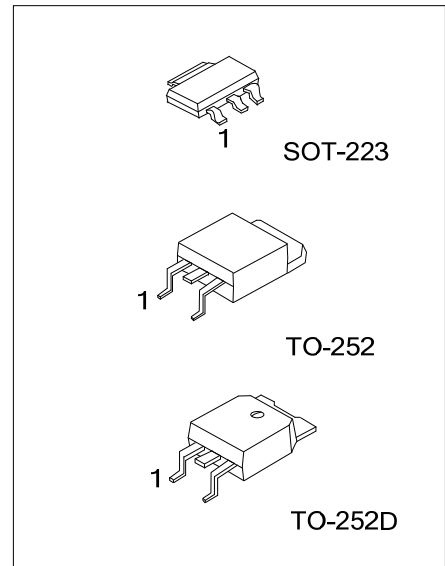
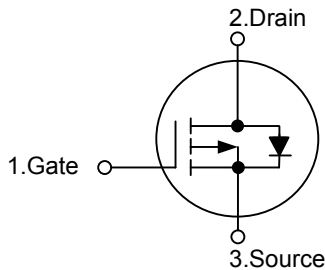
DESCRIPTION

The **UTD413** can provide excellent $R_{DS(ON)}$ and low gate charge by using UTC's advanced trench technology. The **UTD413** is well suited for high current load applications with the excellent thermal resistance of the TO-252 package. Standard Product **UTD413** is Pb-free.

FEATURES

- * $R_{DS(ON)} < 45\text{ m}\Omega$ @ $V_{GS}=-10\text{V}$, $I_D=-12\text{A}$
- * $R_{DS(ON)} < 69\text{ m}\Omega$ @ $V_{GS}=-4.5\text{V}$, $I_D=-8\text{ A}$
- * Low capacitance
- * Low gate charge
- * Fast switching capability
- * Avalanche energy specified

SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
-	UTD413G-AA3-R	SOT-223	G	D	S	Tape Reel
UTD413L-TN3-R	UTD413G-TN3-R	TO-252	G	D	S	Tape Reel
UTD413L-TND-R	UTD413G-TND-R	TO-252D	G	D	S	Tape Reel

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

<p>UTD413G-AA3-R</p>	<p>(1) R: Tape Reel (2) AA3: SOT-223, TN3: TO-252, TND: TO-252D (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

SOT-223	TO-252 / TO-252D

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

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V_{DSS}	-40	V
Gate-Source Voltage	V_{GSS}	± 20	V
Continuous Drain Current	I_D	-12	A
Pulsed Drain Current	I_{DM}	-30	A
Avalanche Current	I_{AR}	-12	A
Repetitive avalanche energy $L=0.1\text{mH}$	E_{AR}	30	mJ
Power Dissipation	SOT-223	0.78	W
	TO-252/TO-252D	2.5	W
Junction Temperature	T_J	+175	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-55 ~ +175	$^{\circ}\text{C}$

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. Pulse width limited by $T_{J(\text{MAX})}$

■ THERMAL DATA

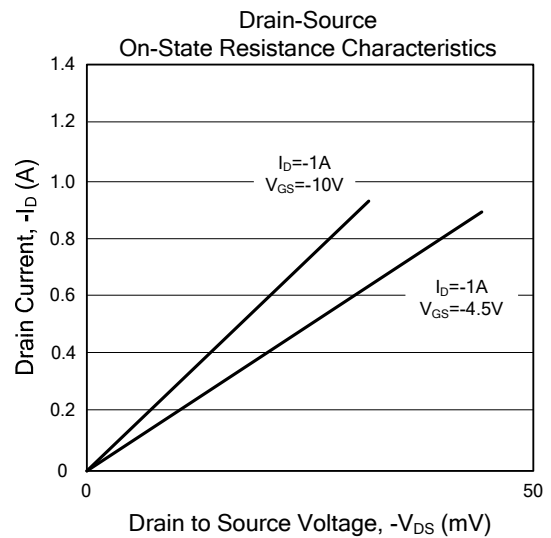
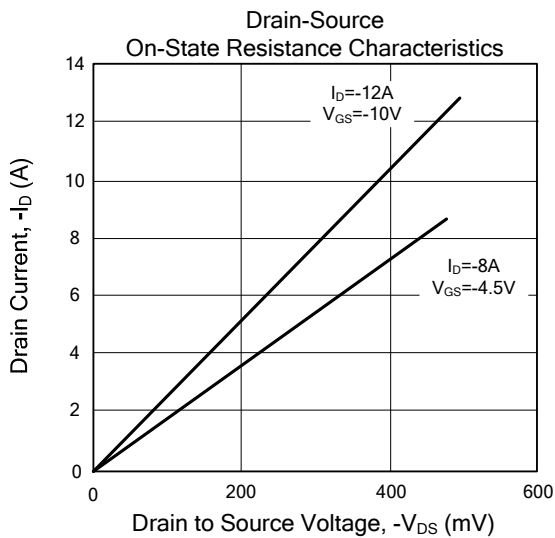
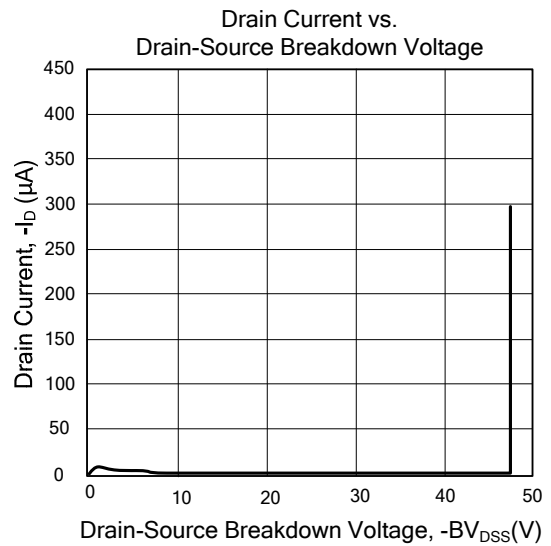
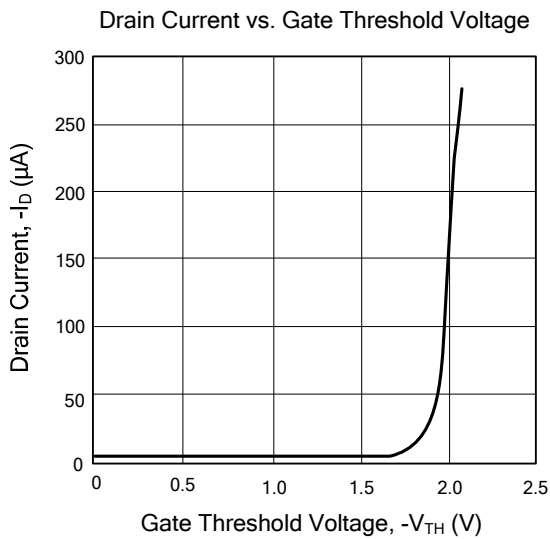
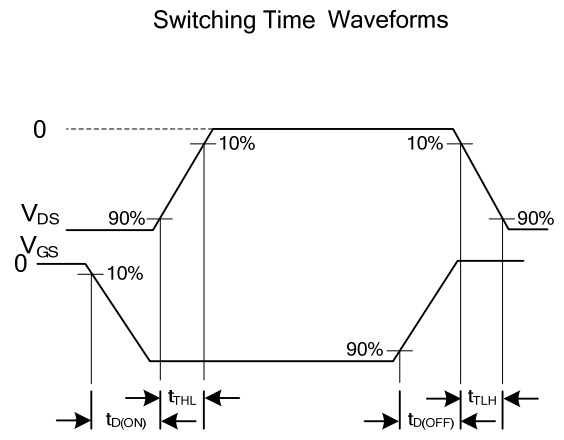
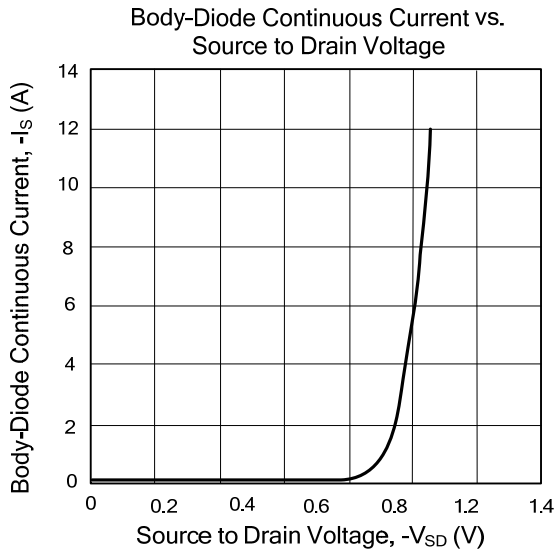
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	160	$^{\circ}\text{C/W}$
	TO-252/TO-252D	50	$^{\circ}\text{C/W}$
Junction to Case	SOT-223	12	$^{\circ}\text{C/W}$
	TO-252/TO-252D	3	$^{\circ}\text{C/W}$

Note: When surface mounted to an FR4 board using minimum recommended pad size. (Cu. Area 0.412 sq in), Steady State.

■ 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}	$V_{GS}=0\text{V}, I_D=-10\text{mA}$	-40			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=-32\text{V}, V_{GS}=0\text{V}$			-1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(\text{TH})}$	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-1	-1.9	-3	V
On State Drain Current	$I_{D(\text{ON})}$	$V_{DS}=-5\text{V}, V_{GS}=-10\text{V}$	-30			A
Static Drain-Source On-Resistance	$R_{DS(\text{ON})}$	$V_{GS}=-10\text{V}, I_D=-12\text{A}$		36	45	m Ω
		$V_{GS}=-4.5\text{V}, I_D=-8\text{A}$		51	69	
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=-20\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$		657		pF
Output Capacitance	C_{OSS}			143		pF
Reverse Transfer Capacitance	C_{RSS}			63		pF
SWITCHING PARAMETERS						
Total Gate Charge	10V	Q_G	$V_{DS}=-20\text{V}, V_{GS}=-10\text{V}, I_D=-12\text{A}$	14.1		nC
	4.5V			7		
Gate Source Charge	Q_{GS}			2.2		nC
Gate Drain Charge	Q_{GD}			4.1		nC
Turn-ON Delay Time	$t_{D(\text{ON})}$			8		ns
Turn-ON Rise Time	t_R			12.2		ns
Turn-OFF Delay Time	$t_{D(\text{OFF})}$			24		ns
Turn-OFF Fall-Time	t_F			12.5		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Diode Forward Voltage	V_{SD}	$I_S=-12\text{A}, V_{GS}=0\text{V}$		-0.75	-1.2	V
Maximum Body-Diode Continuous Current	I_S				-12	A
Body Diode Reverse Recovery Time	t_{RR}	$I_F=-12\text{A}, dI/dt=100\text{A}/\mu\text{s}$		23.2		ns
Body Diode Reverse Recovery Charge	Q_{RR}	$I_F=-12\text{A}, dI/dt=100\text{A}/\mu\text{s}$		18.2		nC

■ TYPICAL CHARACTERISTICS



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