



UTD413

Power MOSFET

P-CHANNEL ENHANCEMENT MODE

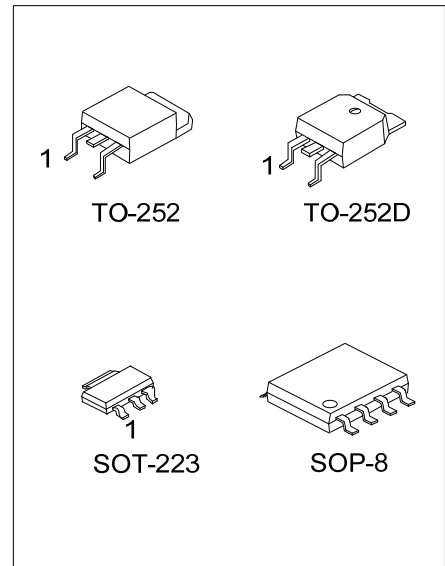
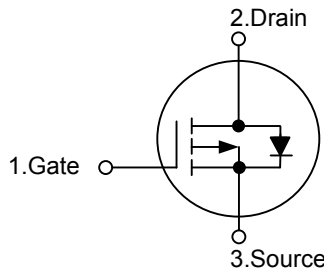
DESCRIPTION

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

- * $R_{DS(ON)} \leq 45 \text{ m}\Omega$ @ $V_{GS} = -10\text{V}$, $I_D = -12\text{A}$
- * $R_{DS(ON)} \leq 69 \text{ m}\Omega$ @ $V_{GS} = -4.5\text{V}$, $I_D = -8.0\text{A}$
- * Low capacitance
- * Low gate charge
- * Fast switching capability
- * Avalanche energy specified

SYMBOL



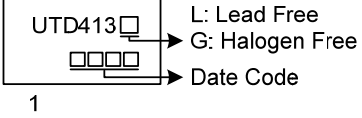
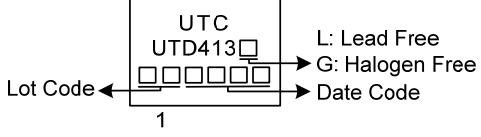
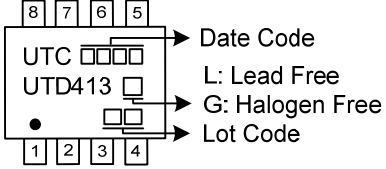
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTD413L-AA3-R	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
UTD413L-S08-R	UTD413G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

<p>UTD413G-AA3-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) AA3: SOT-223, TN3: TO-252, TND: TO-252D</p> <p>S08: SOP-8</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
--	---

■ MARKING

PACKAGE	MARKING
SOT-223	 <p>UTD413 □ → L: Lead Free □ □ □ → G: Halogen Free □ □ □ □ → Date Code 1</p>
TO-252 TO-252D	 <p>UTC UTD413 □ → L: Lead Free □ □ □ □ □ □ → G: Halogen Free Lot Code ← □ □ □ □ □ □ → Date Code 1</p>
SOP-8	 <p>8 7 6 5 → Date Code UTC □ □ □ □ → L: Lead Free UTD413 □ → G: Halogen Free • □ □ → Lot Code 1 2 3 4</p>

■ ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$, 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=0.1mH)	E_{AR}	30	mJ
Power Dissipation	SOT-223	2.4	W
	TO-252/TO-252D	46	W
	SOP-8	1.7	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. Repetitive Rating: Pulse width limited by maximum junction temperature

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT	
Junction to Ambient	θ_{JA}	SOT-223	140	$^\circ\text{C/W}$
		TO-252/TO-252D	50	$^\circ\text{C/W}$
		SOP-8	90	$^\circ\text{C/W}$
Junction to Case	θ_{JC}	SOT-223	52	$^\circ\text{C/W}$
		TO-252/TO-252D	2.7	$^\circ\text{C/W}$
		SOP-8	73	$^\circ\text{C/W}$

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°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-10mA	-40			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =-32V, V _{GS} =0V			-1	μA
Gate-Source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =-250μA	-1.0	-1.9	-3.0	V
On State Drain Current	I _{D(ON)}	V _{DS} =-5V, V _{GS} =-10V	-30			A
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-12A		36	45	mΩ
		V _{GS} =-4.5V, I _D =-8.0A		51	69	
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{DS} =-20V, V _{GS} =0V, f=1MHz		780		pF
Output Capacitance	C _{OSS}			110		pF
Reverse Transfer Capacitance	C _{RSS}			88		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{DS} =-20V, V _{GS} =-10V, I _D =-12A		21.8		nC
Gate Source Charge	Q _{GS}			4.2		nC
Gate Drain Charge	Q _{GD}			3.8		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DS} =-20V, V _{GS} =-10V, R _L =1.7Ω, R _G =6Ω		4		ns
Turn-ON Rise Time	t _R			17		ns
Turn-OFF Delay Time	t _{D(OFF)}			34		ns
Turn-OFF Fall-Time	t _F			23		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				-12	A
Diode Forward Voltage	V _{SD}	I _S =-12A, V _{GS} =0V		-1	-1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F =-12A, dI/dt=100A/μs		55.2		ns
Body Diode Reverse Recovery Charge	Q _{rr}	I _F =-12A, dI/dt=100A/μs		110		nC

- Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.
 2. Essentially independent of operating temperature.

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.