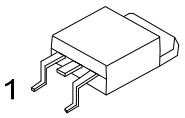
UTD413

Power MOSFET

P-CHANNEL ENHANCEMENT MODE



TO-252

Lead-free: UTD413L
Halogen-free: UTD413G

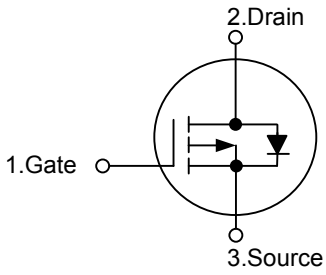
■ DESCRIPTION

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

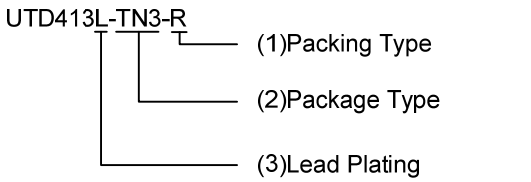
* $R_{DS(ON)}$ < 45mΩ @V_{GS} = -10V
* $R_{DS(ON)}$ < 69mΩ @V_{GS} = -4.5V
* Low capacitance
* Low gate charge
* Fast switching capability
* Avalanche energy specified

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number			Package	Pin Assignment			Packing
Normal	Lead Free	Halogen Free		1	2	3	
UTD413-TN3-R	UTD413L-TN3-R	UTD413G-TN3-R	TO-252	G	D	S	Tape Reel
UTD413-TN3-T	UTD413L-TN3-T	UTD413G-TN3-T	TO-252	G	D	S	Tube



(1) R: Tape Reel, T: Tube

(2) TN3: TO-252

(3) G: Halogen Free, L: Lead Free, Blank: Pb/Sn

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■ ABSOLUTE MAXIMUM RATINGS (T=25℃, 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	P_D	2.5	W
Junction Temperature	T_J	+175	℃
Storage Temperature	T_{STG}	-55 ~ +175	℃

Note: 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 $T_{J(MAX)}$

■ THERMAL CHARACTERISTICS

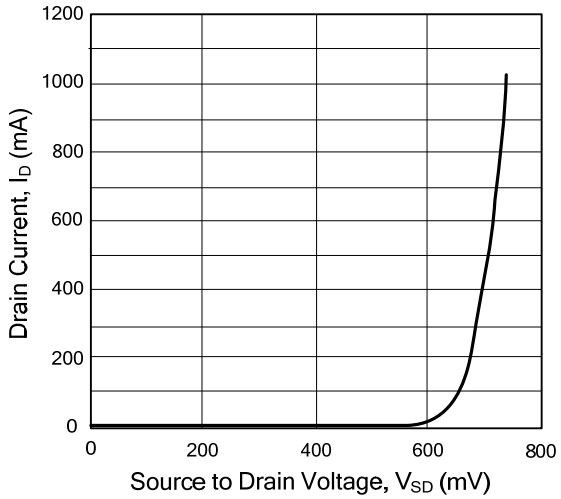
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Junction-to-Ambient	θ_{JA}		40	50	℃/W
Junction-to-Case	θ_{JC}		2.5	3	℃/W

■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

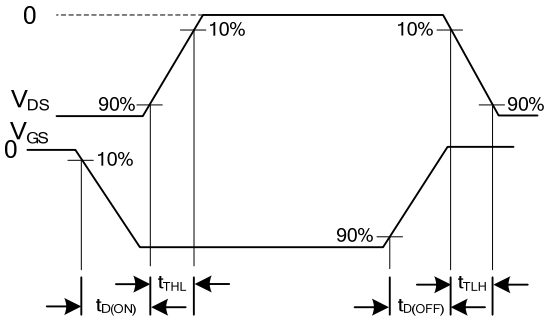
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=-10mA	-40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-32V, V_{GS}=0V			-1	μA
Gate-Source Leakage Current		I_{GSS}	V_{DS}=0V, V_{GS}=±20V			±100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=-250μA	-1	-1.9	-3	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 A		51	69	
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=-20V, V_{GS} =0V, f=1MHz		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}=-20V, V_{GS}=-10V, I_D =-12A		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		$t_{D(ON)}$	V_{GS}=-10V, V_{DS}=-20V, R_L=1.7Ω, R_G=3Ω		8		ns
Turn-ON Rise Time		t_R			12.2		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			24		ns
Turn-OFF Fall-Time		t_F			12.5		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Diode Forward Voltage		V_{SD}	I_S=-1A, V_{GS}=0V		-0.75	-1	V
Maximum Body-Diode Continuous Current		I_S				-12	A
Body Diode Reverse Recovery Time		t_{RR}	I_F=-12A, dI/dt=100A/μs		23.2		ns
Body Diode Reverse Recovery Charge		Q_{RR}	I_F=-12A, dI/dt=100A/μs		18.2		nC

■ TYPICAL CHARACTERISTICS

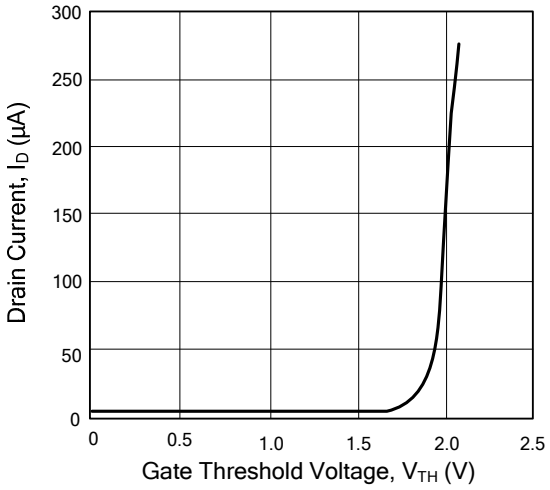
Drain Current vs. Source to Drain Voltage



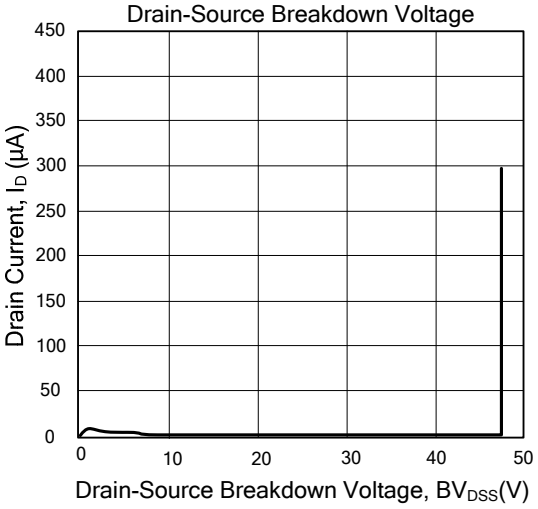
Switching Time Waveforms



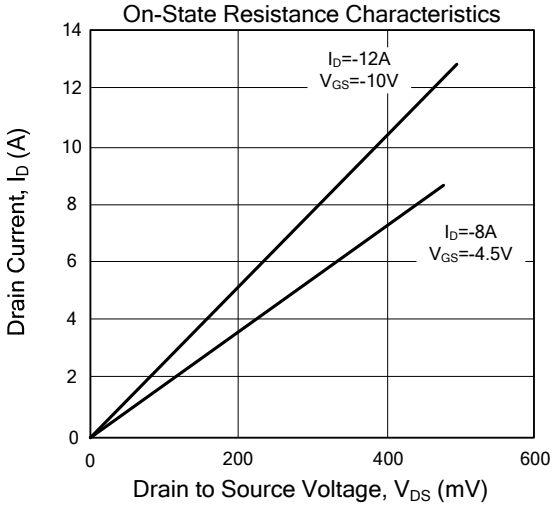
Drain Current vs. Gate Threshold Voltage



Drain Current vs.
Drain-Source Breakdown Voltage



Drain-Source
On-State Resistance Characteristics



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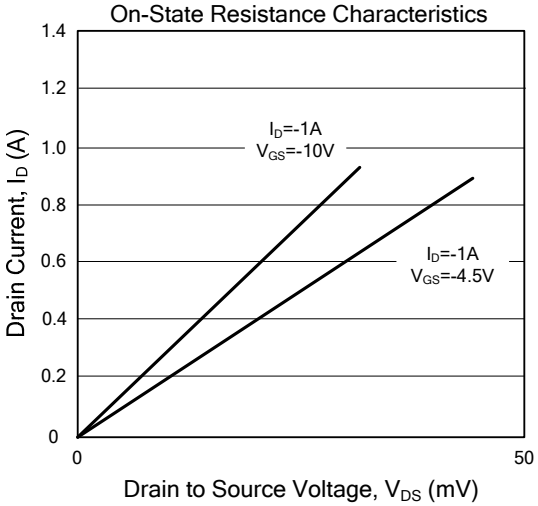
On-State Resistance Characteristics



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