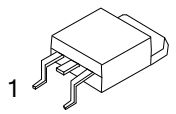
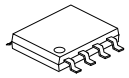
UTD405

Power MOSFET

P-CHANNEL ENHANCEMENT MODE



TO-252



SOP-8

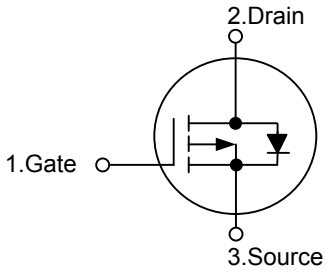
■ DESCRIPTION

The **UTD405** can provide excellent $R_{DS(ON)}$, low gate charge and low gate resistance by using advanced trench technology. This device is well suited for high current load applications with the excellent thermal resistance.

■ FEATURES

* $R_{DS(ON)}$ = 32mΩ @V_{GS} = -10 V
* Low capacitance
* Low gate charge
* Fast switching capability
* Avalanche energy specified

■ SYMBOL



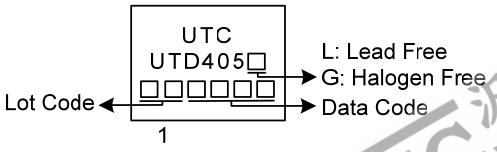
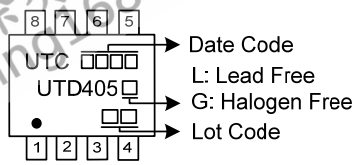
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTD405L-TN3-R	UTD405G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UTD405L-S08-R	UTD405G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

UTD405G-TN3-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) TN3: TO-252, S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-252	SOP-8
	

■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C, unless otherwise specified)

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	-30	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (T_A=25°C) (Note2,4)			I_D	-18	A
Pulsed Drain Current			I_{DM}	-40	A
Avalanche Current (Note3)			I_{AR}	-18	A
Repetitive Avalanche Energy (L=0.1mH) (Note3)			E_{AR}	40	mJ
Power Dissipation	T_A=25°C (Note2)	TO-252	P_D	2.5	W
		SOP-8		1	W
	T_C=25°C (Note2)	TO-252		60	W
		SOP-8		5.2	W
Junction Temperature			T_J	+150	°C
Storage Temperature			T_{STG}	-55 ~ +150	°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	RATING	UNIT
Junction to Ambient (Note 1)	TO-252	θ_{JA}	50	°C/W
	SOP-8		125	°C/W
Junction to Case (Note 3)	TO-252	θ_{JC}	2.08	°C/W
	SOP-8		24	°C/W

Note 1: The value of R θ_{JA} is measured with the device mounted on 1in ^{2} FR-4 board with 2oz. Copper and the maximum temperature of 150°C may be used if the PCB or heat-sink allows it.

2. The power dissipation P_D is based on $T_{J(MAX)}$= 150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heat-sinking is used. It is used to determine the current rating, when this rating falls below the package limit.

3.Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$= 150°C.

4.The maximum current rating is limited by the package current capability.

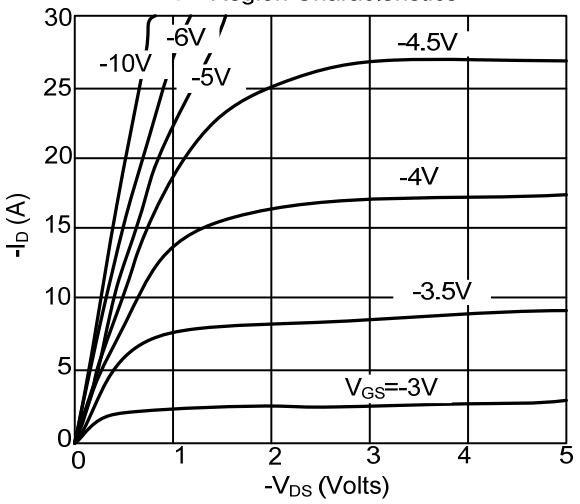
■ ELECTRICAL CHARACTERISTICS (T_J =25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0 V, I_D =-250 μA	-30			V
Drain-Source Leakage Current	I_{DSS}	V_{DS} =-24 V, V_{GS} =0 V		-0.003	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{DS} =0 V, V_{GS} = ±20V			±100	nA
ON CHARACTERISTICS						
Gate-Threshold Voltage	$V_{GS(TH)}$	V_{DS} =V_{GS}, I_D =-250 μA	-1.2	-2	-2.4	V
On state drain current	$I_{D(ON)}$	V_{GS}=-10V, V_{DS}=-5V	-40			A
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS} =-10 V, I_D =-18A		24.5	32	mΩ
		V_{GS} =-4.5 V, I_D =-10A		41	60	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS} =-15 V, V_{GS} =0V, f=1MHz		920	1100	pF
Output Capacitance	C_{OSS}			190		pF
Reverse Transfer Capacitance	C_{RSS}			122		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	V_{DS} =-15V, V_{GS} =-10V, I_D =-18A		18.7	23	nC
Gate-Source Charge	Q_{GS}			2.54		nC
Gate-Drain Charge	Q_{GD}			5.4		nC
Turn-ON Delay Time	$t_{D(ON)}$	V_{GS}=-10V,V_{DS}=-15V, R_L=0.82Ω, R_G=3Ω		9	13	ns
Turn-ON Rise Time	t_R			25	35	ns
Turn-OFF Delay Time	$t_{D(OFF)}$			20	30	ns
Turn-OFF Fall-Time	t_F			12	18	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				-18	A
Drain-Source Diode Forward Voltage	V_{SD}	I_S=-1A,V_{GS}=0V		-0.76	-1	V
Body Diode Reverse Recovery Time	T_{rr}	I_F=-18A, dI/dt=100A/μs		21.4	26	ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F=-18A, dI/dt=100A/μs		13	16	nC

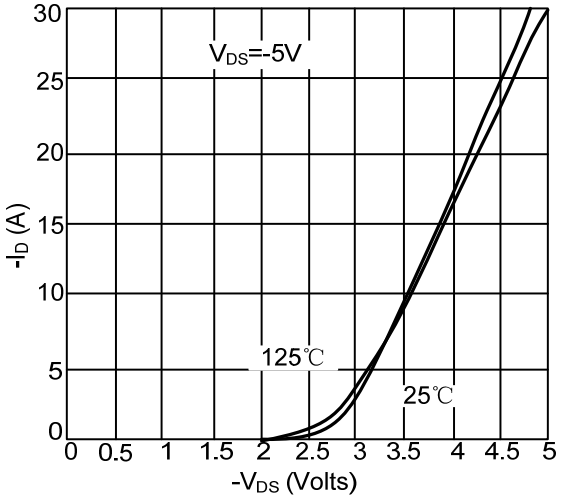
Notes: 5. Pulse width limited by $T_{J(MAX)}$
6. Pulse width ≤300us, duty cycle 0.5% max.

■ TYPICAL CHARACTERISTICS

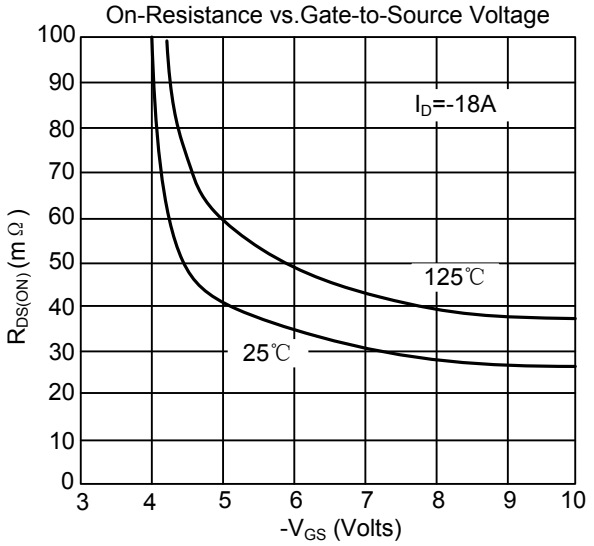
On-Region Characteristics



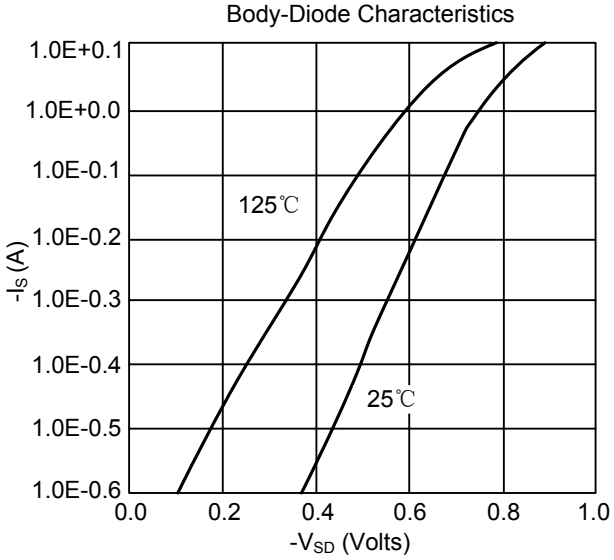
Transfer Characteristics



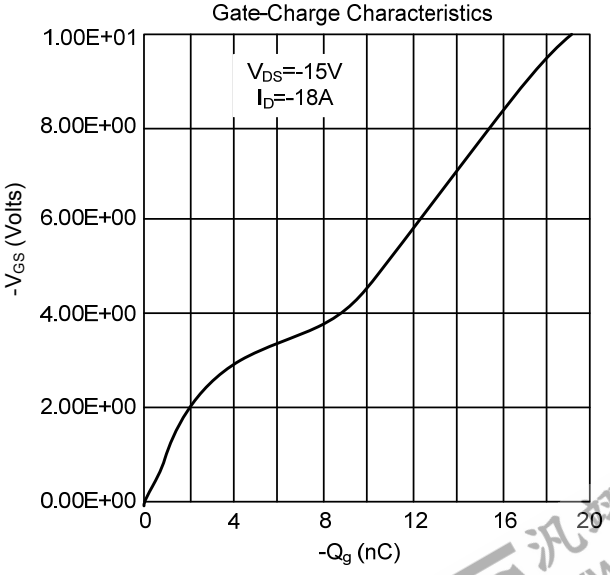
On-Resistance vs.Gate-to-Source Voltage



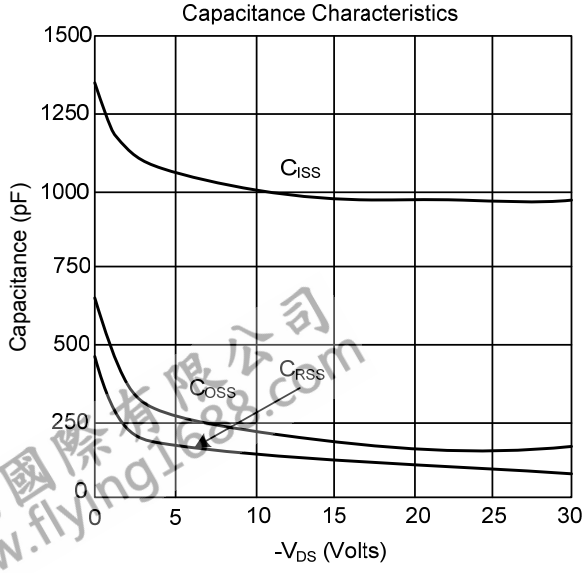
Body-Diode Characteristics



Gate-Charge Characteristics

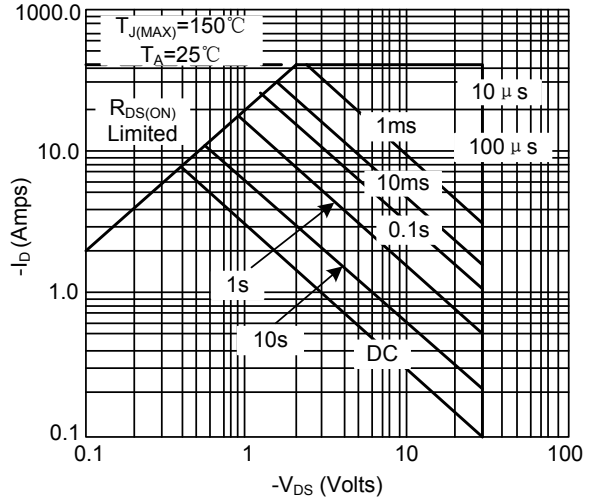


Capacitance Characteristics

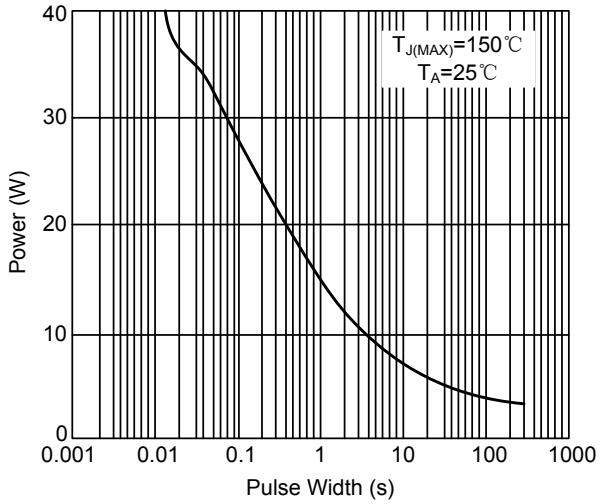


■ TYPICAL CHARACTERISTICS (Cont.)

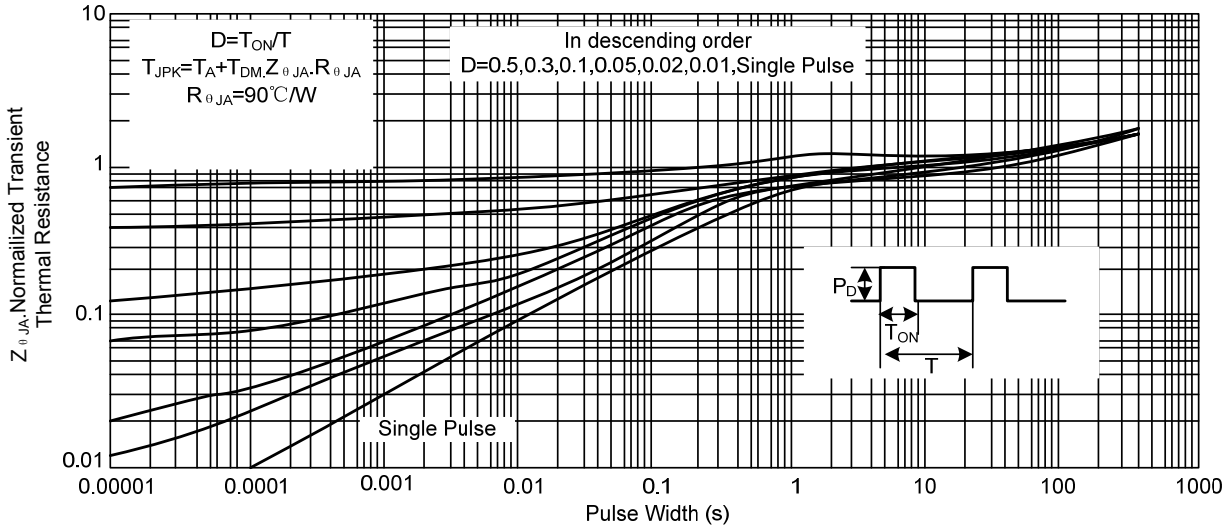
Maximum Forward Biased Safe Operating Area



Single Pulse Power Rating Junction-to-Ambient



Normalized Maximum Transient Thermal Impedance



On-Resistance vs.Drain Current and Gate Voltage