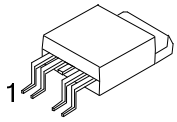
UD3004-H

Power MOSFET

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



TO-252-4

■ DESCRIPTION

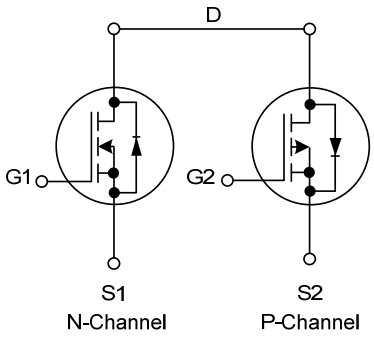
The UTC **UD3004-H** incorporates an N-channel MOSFET and a P-channel MOSFET, it uses UTC's advanced technology to provide customers a minimum on-state resistance and high-speed switching, thereby enabling high-density mounting.

The UTC **UD3004-H** is universally applied in high-speed switching, motor driver.

■ FEATURES

* $R_{DS(on)}$ < 32 mΩ @ V_{GS} = 10V, I_D=6.0A
* $R_{DS(on)}$ < 40 mΩ @ V_{GS} =-10V, I_D=-5.0A
* High switching speed

■ SYMBOL



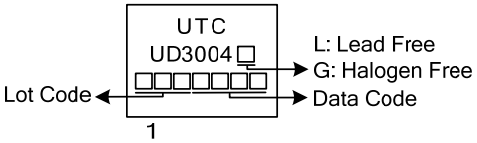
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment					Packing
Lead Free	Halogen Free		1	2	3	4	5	
UD3004L-TN4-R	UD3004G-TN4-R	TO-252-4	S1	G1	D1/D2	S2	G2	Tape Reel

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

UD3004L-TN4-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) TN4: TO-252-4, TN5: TO-252-5 (3) L: Lead Free, G: Halogen Free and Lead Free

■ MARKING



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

PARAMETER		SYMBOL	RATINGS		UNIT
			N-CHANNEL	P-CHANNEL	
Drain-Source Voltage		V_{DSS}	40	-40	V
Gate-Source Voltage		V_{GSS}	±20	±20	V
Drain Current	Continuous (Note 3)	I_D	15	-12	A
	Pulsed (Note 1)	I_{DM}	60	-48	A
Power Dissipation		P_D	20		W
Junction Temperature		T_J	-55 ~ +150		°C
Storage Temperature Range		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	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62	°C/W
Junction to Case	θ_{JC}	6	°C/W

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

N-channel

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=40V, V_{GS}=0V, T_A=25°C			1	μA
			V_{DS}=32V, V_{GS}=0V, T_A=125°C			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V			+100	nA
	Reverse		V_{GS}=-20V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	1.0		2.5	V
Static Drain-Source On-State Resistance (Note 1)		$R_{DS(ON)}$	V_{GS}=10V, I_D=6A			32	mΩ
			V_{GS}=4.5V, I_D=4A			42	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=15V, f=1.0MHz		420		pF
Output Capacitance		C_{OSS}			65		pF
Reverse Transfer Capacitance		C_{RSS}			40		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=20V, V_{GS}=4.5V, I_D=6.0A, I_G = 250μA (Note 1, 2)		5.2		nC
Gate to Source Charge		Q_{GS}			1.2		nC
Gate to Drain Charge		Q_{GD}			2.5		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DD} =20V, V_{GS}=4.5V, I_D =1.0A, R_G=25Ω (Note 1, 2)		3.2		ns
Rise Time		t_R			8.6		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			18		ns
Fall-Time		t_F					ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				15	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				30	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=1.0A, V_{GS}=0V			1.0	V

■ ELECTRICAL CHARACTERISTICS(Cont.)

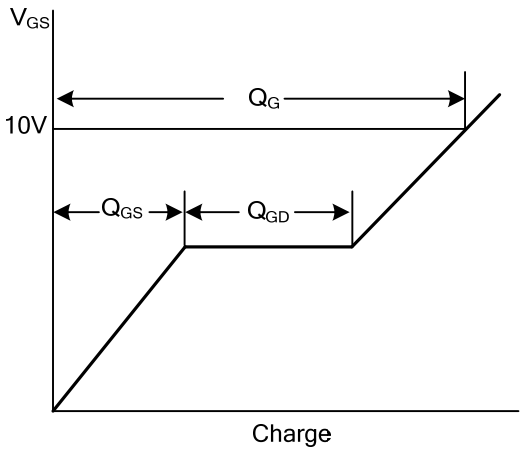
P-Channel

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=-250μA, V_{GS}=0V	-40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-40V, V_{GS}=0V, T_A=25°C			-1	μA
			V_{DS}=-32V, V_{GS}=0V, T_A=125°C			-10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+10V, V_{GS}=0V			+100	nA
	Reverse		V_{GS}=-10V, V_{GS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=-250μA	-1.0		-2.5	V
Static Drain-Source On-State Resistance (Note 1)		$R_{DS(ON)}$	V_{GS}=-10V, I_D=-5A			40	mΩ
			V_{GS}=-4.5V, I_D=-3A			52	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=-15V, f=1.0MHz		1050		pF
Output Capacitance		C_{OSS}			110		pF
Reverse Transfer Capacitance		C_{RSS}			80		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=-20V, V_{GS}=-4.5V, I_D=-5.0A (Note 1, 2)		9.0		nC
Gate to Source Charge		Q_{GS}			2.5		nC
Gate to Drain Charge		Q_{GD}			3.2		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=-20V, V_{GS}=-4.5V, I_D=-1.0A, R_G=25Ω (Note 1, 2)		20		ns
Rise Time		t_R			12		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			46		ns
Fall-Time		t_F			6.0		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				-12	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				-24	A
Drain-Source Diode Forward Voltage(Note 1)		V_{SD}	I_S=-1.0A, V_{GS}=0V			-1.0	V

Notes: 1. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%.
2. Essentially independent of operating temperature.

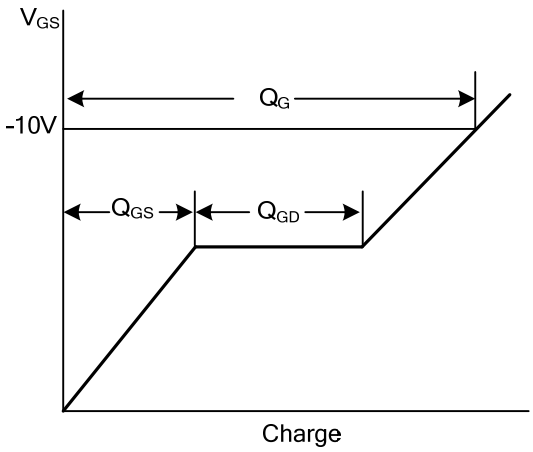
■ TEST CIRCUITS AND WAVEFORMS

N-CHANNEL



Gate Charge Waveforms

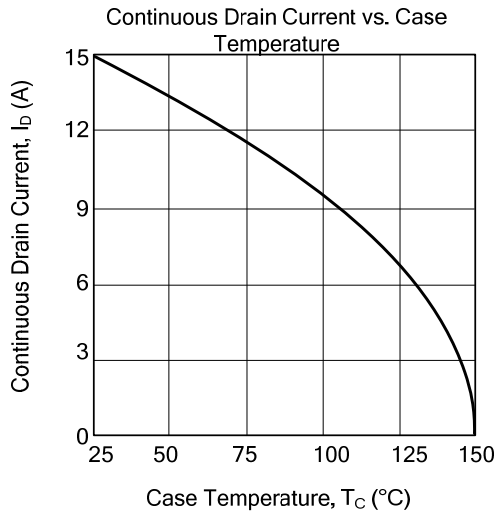
P-CHANNEL

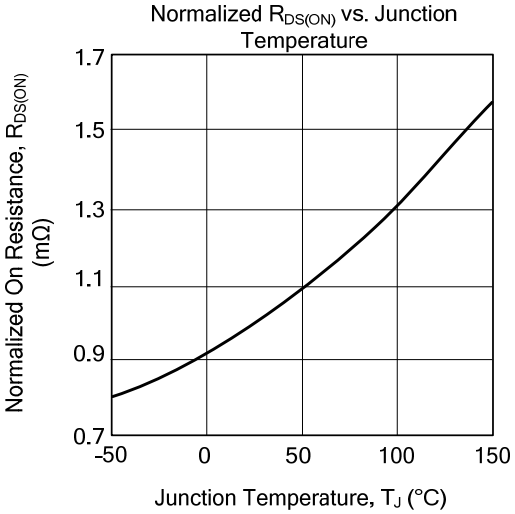


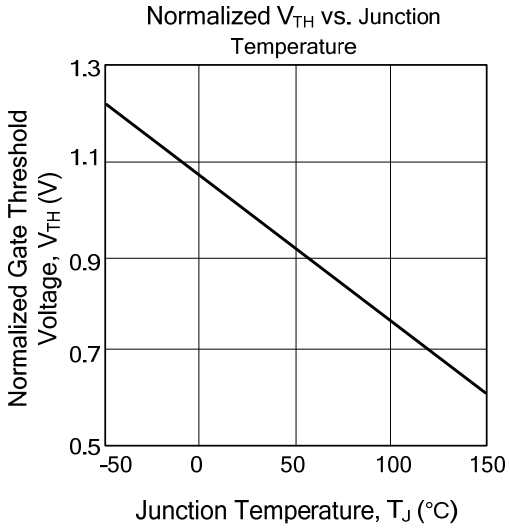
Gate Charge Waveforms

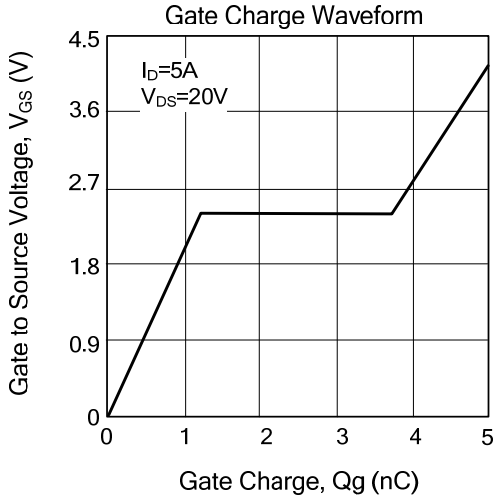
■ TYPICAL CHARACTERISTICS

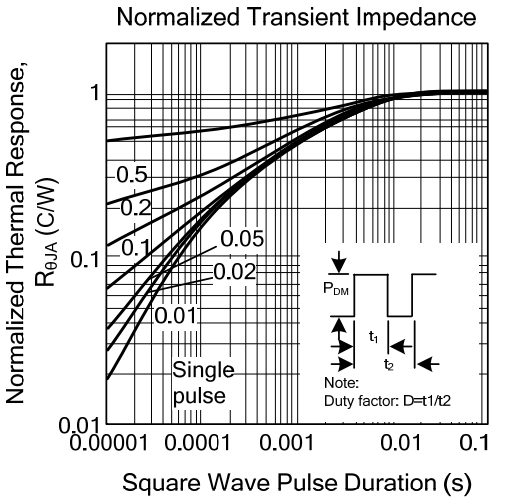
N-Channel

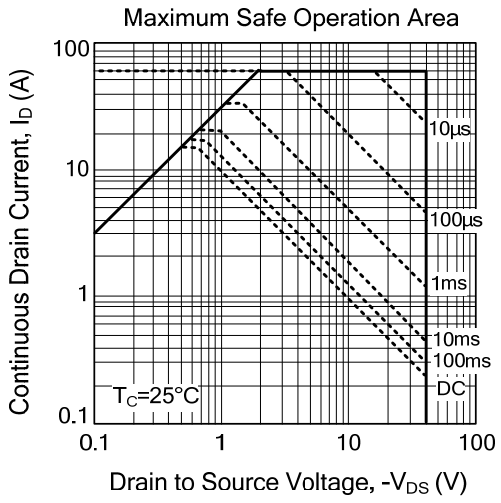












■ TYPICAL CHARACTERISTICS (Cont.)

P-Channel