



## UD4P02

Preliminary

Power MOSFET

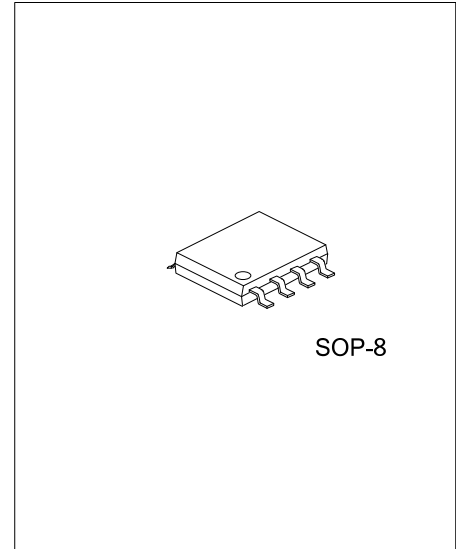
### -4.0A, -20V DUAL P-CHANNEL POWER MOSFET

#### DESCRIPTION

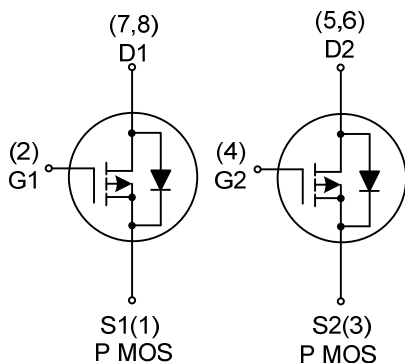
The UTC **UD4P02** uses advanced technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with low gate voltages. This device is manufacturing reproducible. The UTC **UD4P02** is suitable for applications, such as battery management in nomadic equipment and power management in cellular phone.

#### FEATURES

- \*  $R_{DS(ON)} < 80 \text{ m}\Omega$  @  $V_{GS} = -10 \text{ V}$ ,  $I_D = -2.0 \text{ A}$
- \* Low on-resistance
- \* Rugged avalanche characteristic
- \* Easy automated surface mount assembly with standard outline
- \* Low threshold drive



#### SYMBOL



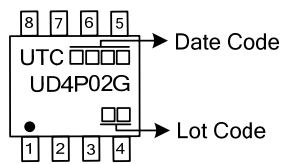
#### ORDERING INFORMATION

Ordering Number	Package	Pin Assignment								Packing
		1	2	3	4	5	6	7	8	
UD4P02G-S08-R	SOP-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

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

UD4P02G-S08-R	(1)Packing Type	(1) R: Tape Reel
	(2)Package Type	(2) S08: SOP-8
	(3)Green Package	(3) G: Halogen Free and Lead Free

## ■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (unless otherwise specified.)

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage ( $V_{GS}=0V$ )	$V_{DSS}$	-20	V
Drain-Gate Voltage ( $R_{GS}=20k\Omega$ )	$V_{DGR}$	-20	V
Gate-Source Voltage	$V_{GSS}$	$\pm 16$	V
Continuous Drain Current ( $T_C=25^\circ C$ , Single Operation)	$I_D$	-4	A
Pulsed Drain Current (Note 2)	$I_{DM}$	-16	A
Power Dissipation ( $T_C=25^\circ C$ )	Dual Operation	1.6	W
	Single Operation	2	W
Junction Temperature	$T_J$	+150	$^\circ C$
Storage Temperature	$T_{STG}$	-55 ~ +150	$^\circ C$

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 safe operating area.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	Single Operation	62.5	$^\circ C/W$
	Dual Operation	78	$^\circ C/W$

Note: When Mounted on 0.5 in<sup>2</sup> pad of 2oz. copper

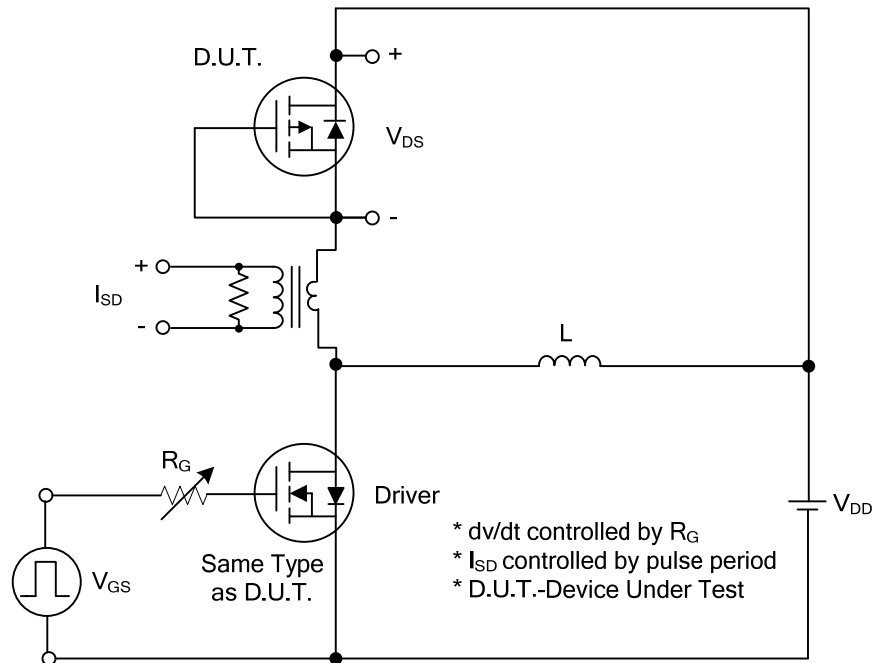
■ ELECTRICAL CHARACTERISTICS ( $T_C=25^\circ C$ , unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0 V	-20			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = -20 V, V <sub>GS</sub> =0 V			-1	μA
Gate- Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±16 V, V <sub>DS</sub> =0 V			±100	nA
ON CHARACTERISTICS (Note 1)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.0	-1.6	-2.5	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -2.0A		70	80	mΩ
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -2.0A		85	100	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = -25 V, V <sub>GS</sub> =0 V f=1MHz		1350		pF
Output Capacitance	C <sub>OSS</sub>			490		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			130		pF
SWITCHING PARAMETERS						
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =-15V, I <sub>D</sub> =-2A , V <sub>GS</sub> =-4.5 V, R <sub>G</sub> =4.7 Ω		25		ns
Turn-ON Rise Time	t <sub>R</sub>			35		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			125		ns
Turn-OFF Fall-Time	t <sub>F</sub>			35		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DD</sub> = -24 V, V <sub>GS</sub> = -5 V I <sub>D</sub> = -4 A		12.5	16	nC
Gate Source Charge	Q <sub>GS</sub>			5		nC
Gate Drain Charge	Q <sub>GD</sub>			3		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage (Note 1)	V <sub>SD</sub>	I <sub>SD</sub> = -4 A, V <sub>GS</sub> =0 V			-1.2	V
Maximum Continuous Drain-Source Diode Forward Current	I <sub>SD</sub>				-4	A
Maximum Pulsed Drain-Source Diode Forward Current (Note 2)	I <sub>SDM</sub>				-16	A
Reverse Recovery Time	t <sub>rr</sub>	I <sub>SD</sub> =-4A, V <sub>DD</sub> =-15V		45		ns
Reverse Recovery Charge	Q <sub>RR</sub>	dI/dt =100A/μs, T <sub>J</sub> =150°C		36		nC

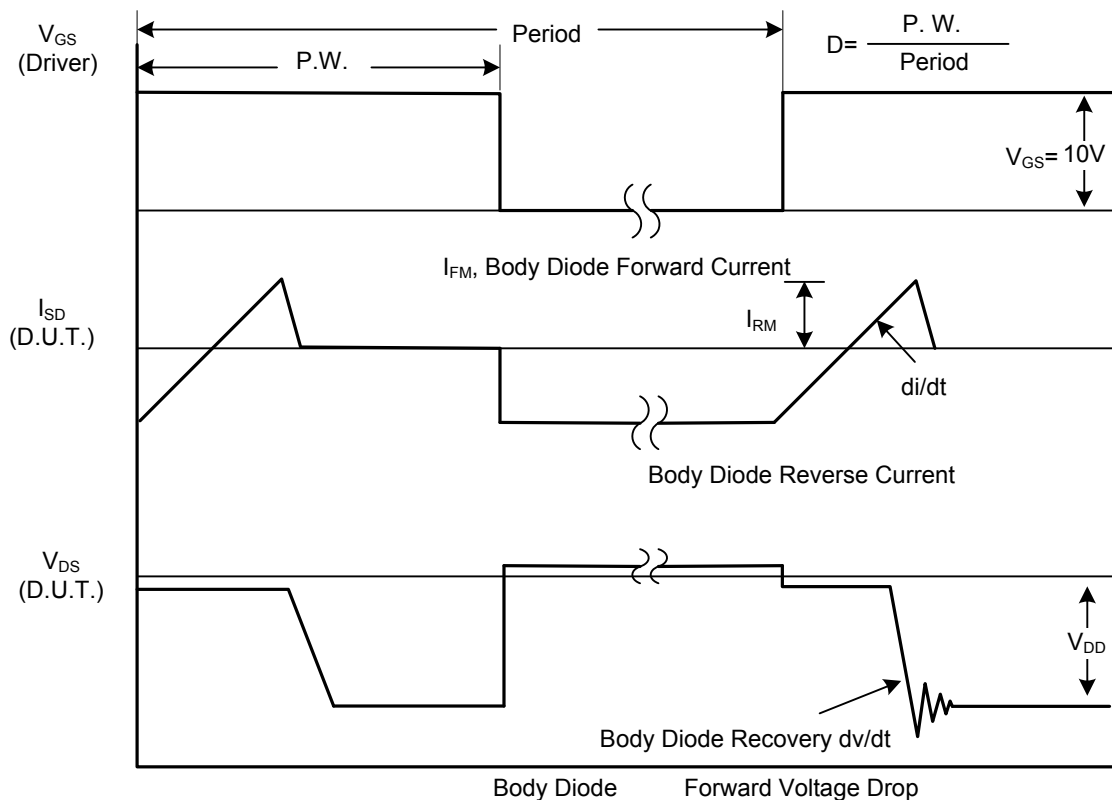
Notes: 1. Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 1.5\%$ .

2. Pulse width limited by safe operating area.

# ■ TEST CIRCUITS AND WAVEFORMS

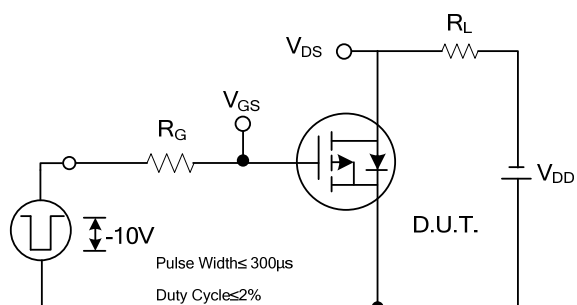


Peak Diode Recovery dv/dt Test Circuit

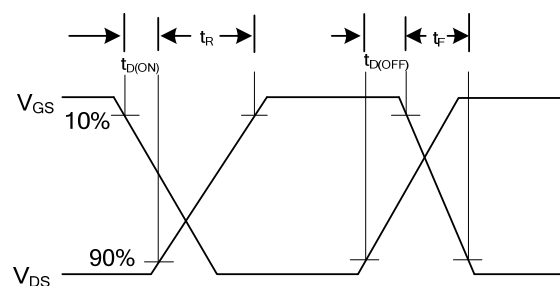


Peak Diode Recovery dv/dt Waveforms

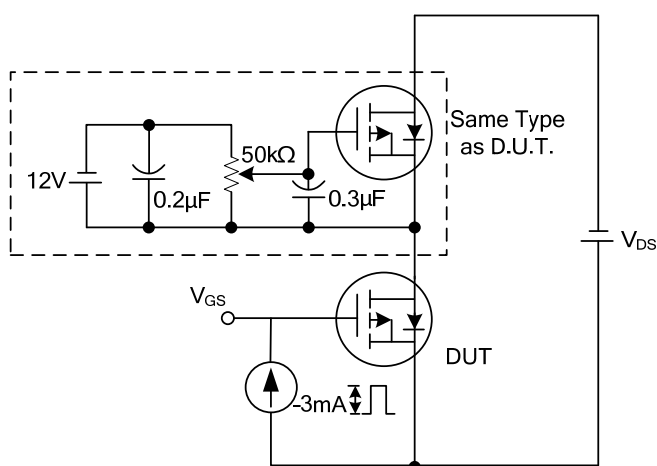
# ■ TEST CIRCUITS AND WAVEFORMS (Cont.)



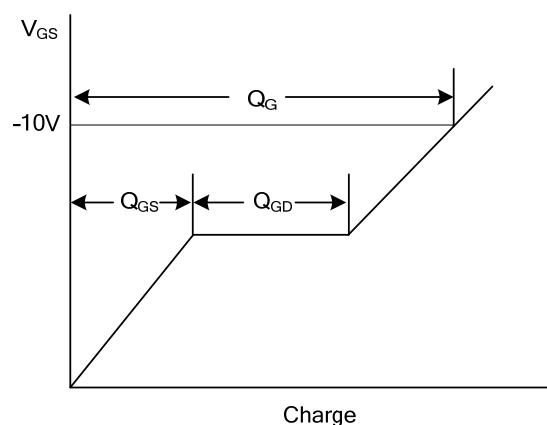
Switching Test Circuit



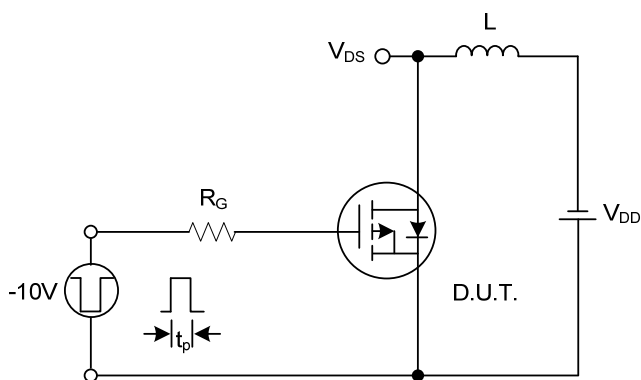
Switching Waveforms



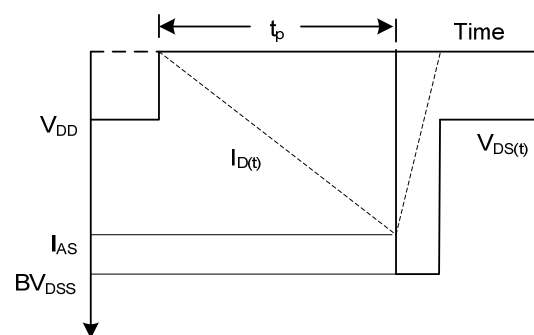
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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