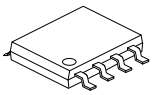
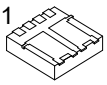
6.0A, 40V DUAL N-CHANNEL ENHANCEMENT MODE TRENCH POWER MOSFET



SOP-8



PDFN3×3

■ DESCRIPTION

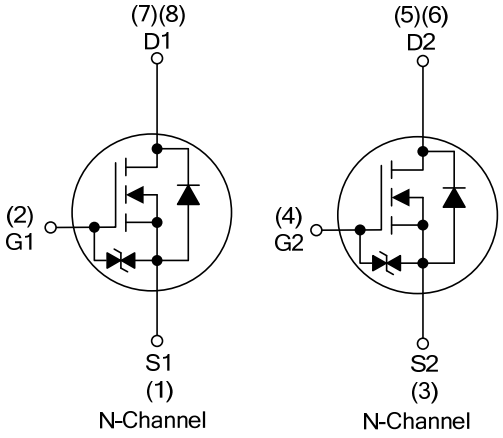
The UTC **UD12N04Z** is a Dual N-channel enhancement mode power MOSFET using UTC's advanced technology to provide customers with an extremely low on-state resistance and superior switching performance.

The UTC **UD12N04Z** is suitable for high frequency DC-DC converters with synchronous rectification applications.

■ FEATURES

* $R_{DS(ON)} \leq 38\ m\Omega$ @ V_{GS}=10V, I_D=6.0A
  $R_{DS(ON)} \leq 54\ m\Omega$ @ V_{GS}=4.5V, I_D=6.0A
* High Power and Current Handling Capability
* High Cell Density Trench Technology
* With ESD Protected

■ SYMBOL



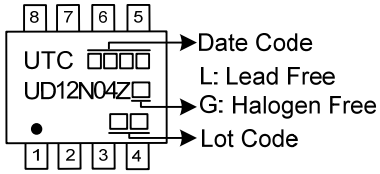
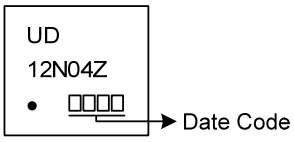
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UD12N04ZL-S08-R	UD12N04ZG-S08-R	SOP-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel
UD12N04ZL-P3030-R	UD12N04ZG-P3030-R	PDFN3×3	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

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

UD12N04ZG-S08-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) S08: SOP-8, P3030: PDFN3×3 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

SOP-8	PDFN3×3
	

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	40	V
Gate-Source Voltage		V_{GSS}	±12	V
Drain Current	Continuous	I_D	6	A
	Pulsed (Note 2)	I_{DM}	12	A
Avalanche Energy	Single Pulsed (Note 4)	E_{AS}	11	mJ
Peak Diode Recovery dv/dt (Note 5)		dv/dt	2.1	V/ns
Power Dissipation	SOP-8	P_D	1.08	W
	PDFN3×3		19	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°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.
3. Mounted on a ceramic board.
4. L = 0.01mH, I_{AS} = 46.9A, V_{DD} = 20V, R_G = 25Ω, Starting T_J = 25°C.
5. I_{SD} ≤ 12A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J=25°C.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-8	θ_{JA}	125	°C/W
	PDFN3×3		60	°C/W
Junction to Case	SOP-8	θ_{JC}	115	°C/W
	PDFN3×3		6.58	°C/W

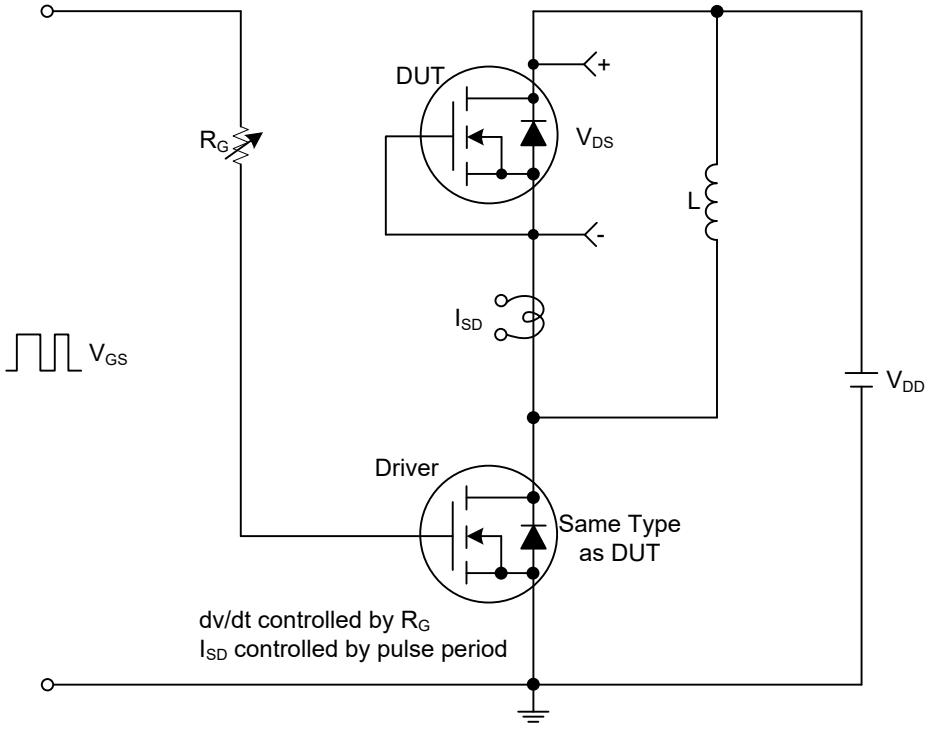
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

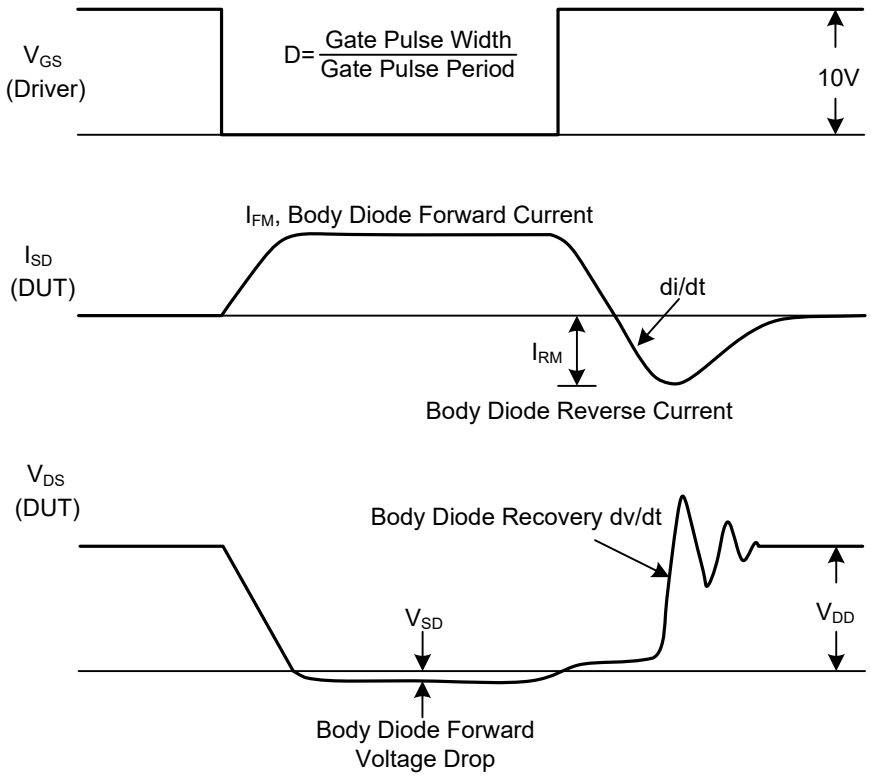
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=40V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+12V, V_{DS}=0V			+10	μA
	Reverse		V_{GS}=-12V, V_{DS}=0V			-10	μA
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		$R_{DS(ON)}$	V_{GS}=10V, I_D=6.0A			38	mΩ
			V_{GS}=4.5V, I_D=6.0A			54	mΩ
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS}=10V, V_{GS}=0V, f=1.0MHz		401		pF
Output Capacitance		C_{OSS}			72		pF
Reverse Transfer Capacitance		C_{RSS}			62		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=32V, V_{GS}=10V, I_D=12A (Note 1, 2)		17		nC
Gate-Source Charge		Q_{GS}			3		nC
Gate-Drain Charge		Q_{GD}			5		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=20V, V_{GS}=10V, I_D=12A, R_G =3.0Ω (Note 1, 2)		2		ns
Rise Time		t_R			17		ns
Turn-off Delay Time		$t_{D(OFF)}$			18		ns
Fall-Time		t_F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				12	A
Maximum Body-Diode Pulsed Current		I_{SM}				24	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=6.0A, V_{GS}=0V			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=12A, V_{GS}=0V		21		ns
Reverse Recovery Charge		Q_{rr}	dI_F/dt=100A/μs (Note1)		8		nC

Notes: 1. Pulse Test: Pulse width ≤ 10μs, Duty cycle ≤ 1%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



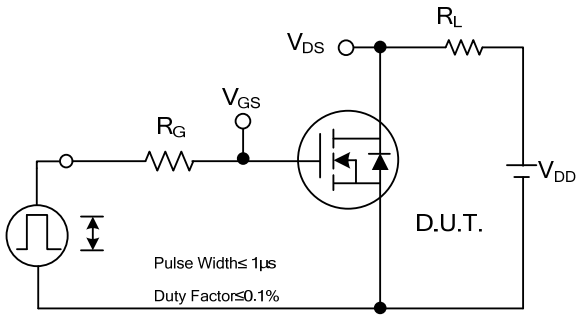
Peak Diode Recovery dv/dt Test Circuit



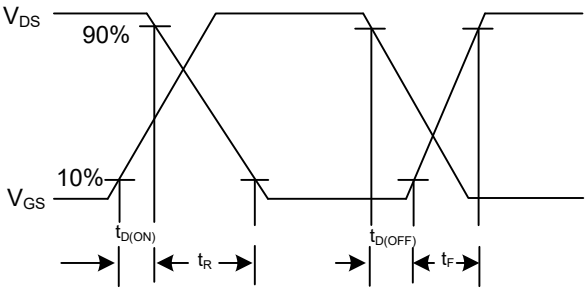
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

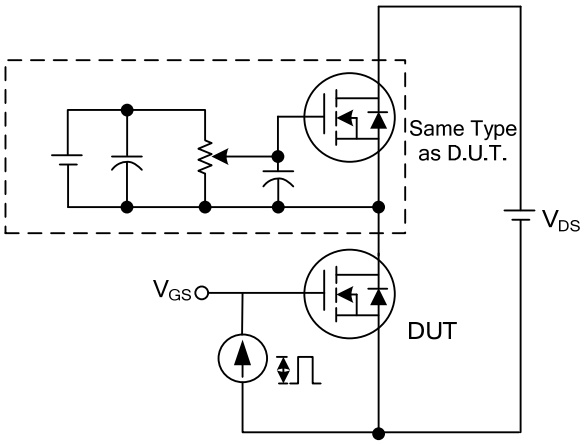
■ TEST CIRCUITS AND WAVEFORMS



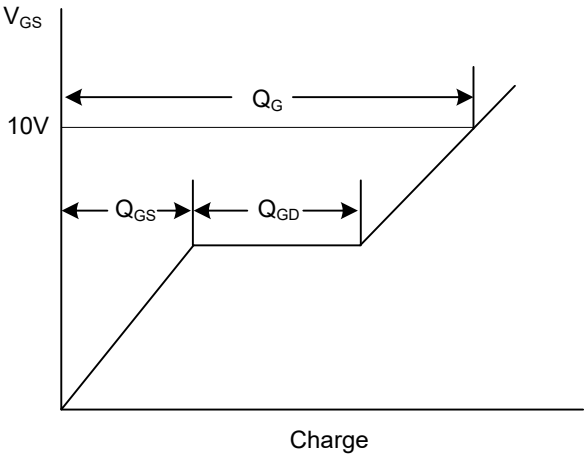
Switching Test Circuit



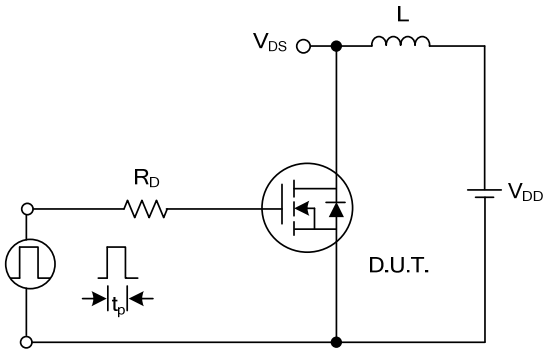
Switching Waveforms



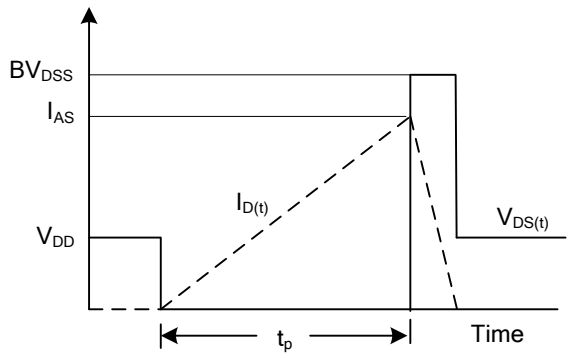
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms