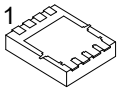
40A, 25V N-CHANNEL POWER MOSFET



PDFN5×6

PDFN3×3

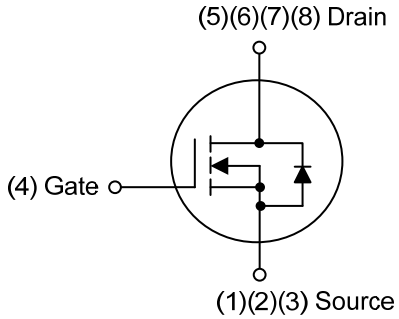
■ DESCRIPTION

The UTC **UT40N025** is a N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $R_{DS(ON)}$ and fast switching speed.

■ FEATURES

* $R_{DS(ON)} \leq 6.0\ m\Omega$ @ V_{GS}=10V, I_D=20A
* $R_{DS(ON)} \leq 8.0\ m\Omega$ @ V_{GS}=4.5V, I_D=20A
* Fast switching capability
* Avalanche energy specified
* Improved dv/dt capability, high ruggedness

■ SYMBOL



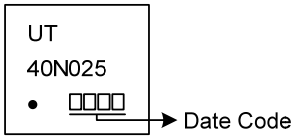
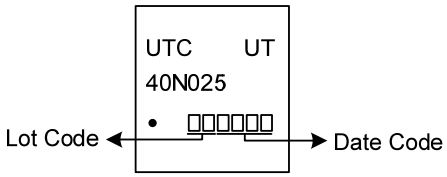
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT40N025L-P3030-R	UT40N025G-P3030-R	PDFN3×3	S	S	S	G	D	D	D	D	Tape Reel
UT40N025L-P5060-R	UT40N025G-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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

UT40N025G-P3030-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) P3030: PDFN3×3, P5060: PDFN5×6 (3) G: Halogen Free and Lead Free, K: Lead Free

■ MARKING

PDFN3×3	PDFN5×6
	

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	25	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous	I_D	40	A
	Pulsed (Note 2)	I_{DM}	80	A
Avalanche energy	Single Pulsed (Note 3)	E_{AS}	54	mJ
Power Dissipation	PDFN3×3	P_D	32	W
	PDFN5×6		41	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. L=0.1mH, I_{AS}=33A, V_{DD}=20V, R_G=25Ω, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction-to-Ambient	PDFN3×3	θ_{JA}	75	°C/W
	PDFN5×6		65	°C/W
Junction-to-Case	PDFN3×3	θ_{JC}	3.9	°C/W
	PDFN5×6		3.05	°C/W

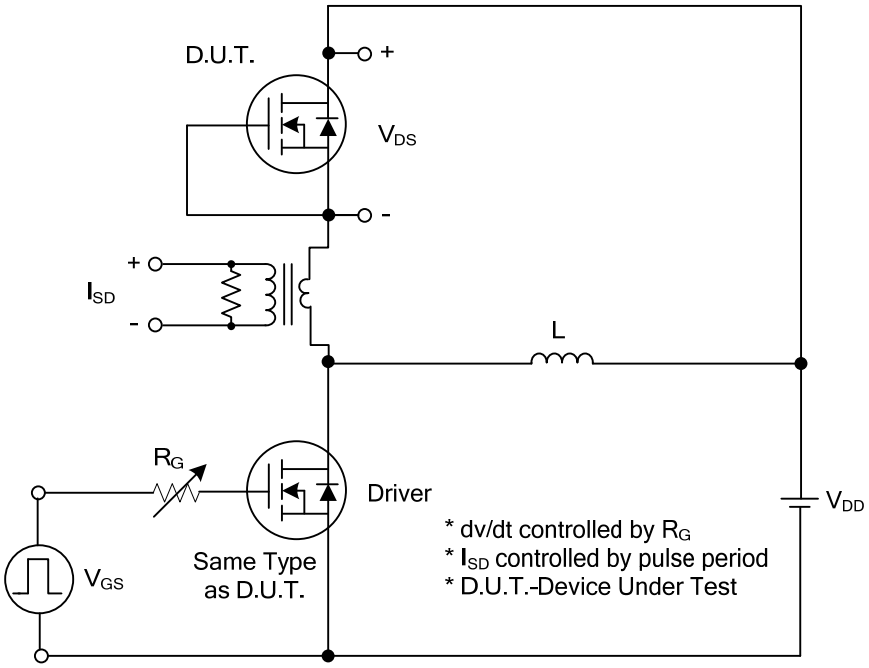
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

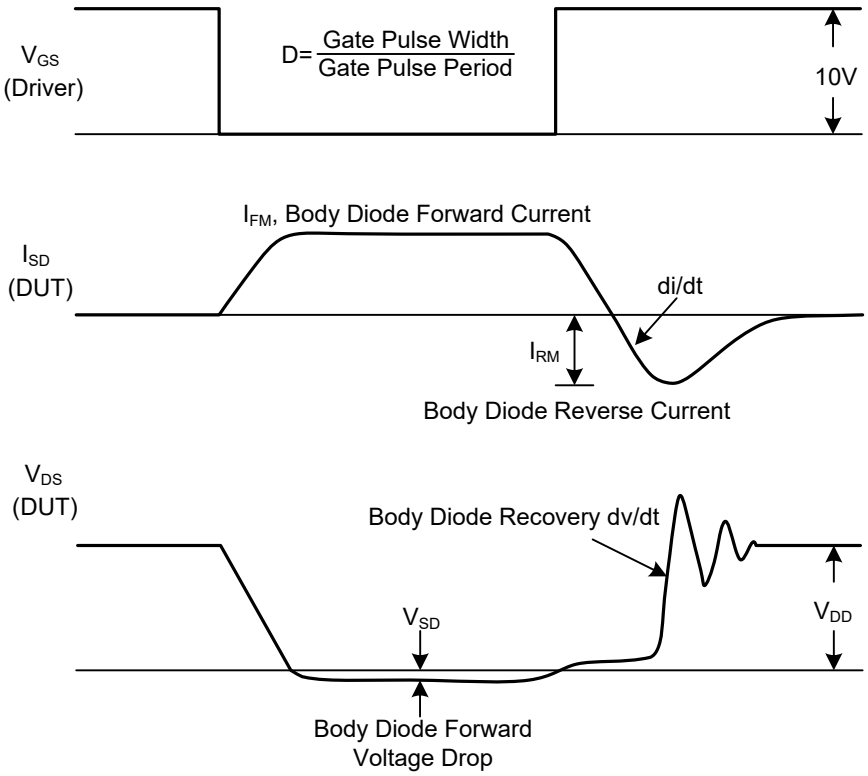
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	25			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=25V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=20V, V_{DS}=0V			100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	1.0		3.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=20A			6.0	mΩ
			V_{GS}=4.5V, I_D=20A			8.0	mΩ
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS}=15V, V_{GS}=0V, f=1MHz		2090		pF
Output Capacitance		C_{OSS}			530		pF
Reverse Transfer Capacitance		C_{RSS}			500		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=20V, V_{GS}=4.5V, I_D=40A, (Note 1, 2)		51		nC
Gate to Source Charge		Q_{GS}			11		nC
Gate to Drain Charge		Q_{GD}			27		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=12.5V, V_{GS}=10V, I_D=40A, R_G=3Ω (Note 1, 2)		10		ns
Rise Time		t_R			20		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			60		ns
Fall-Time		t_F			36		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Body-Diode Continuous Current		I_S				40	A
Maximum Body-Diode Pulsed Current (Note 1)		I_{SM}				80	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=40A, V_{GS}=0V			1.4	V

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

■ TEST CIRCUITS AND WAVEFORMS

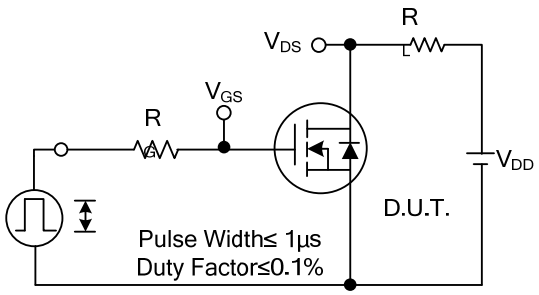


Peak Diode Recovery dv/dt Test Circuit

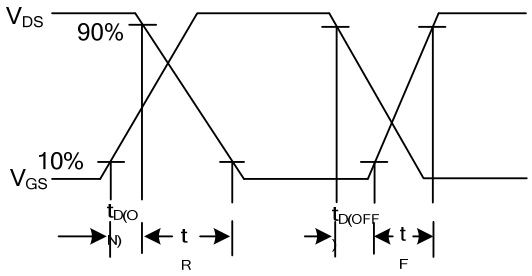


Peak Diode Recovery dv/dt Waveforms

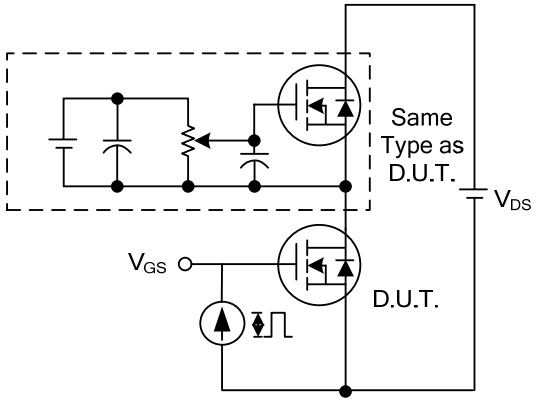
■ TEST CIRCUITS AND WAVEFORMS



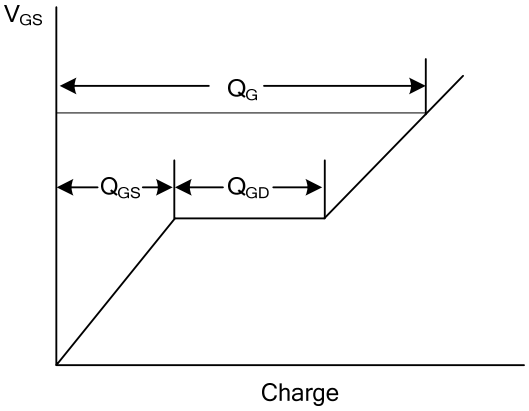
Switching Test Circuit



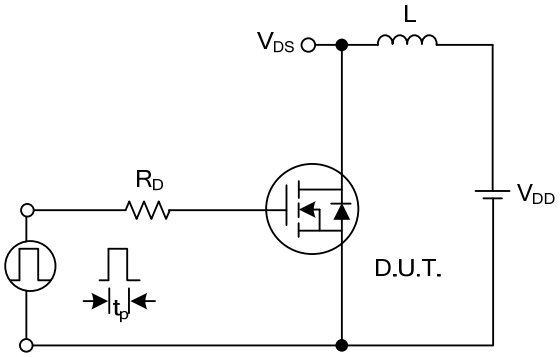
Switching Waveforms



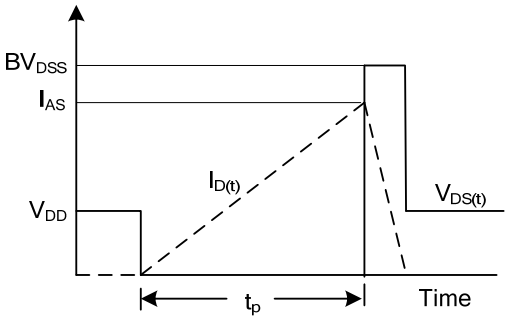
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms