

## UTM6016

### Power MOSFET

# 8A, 60V N-CHANNEL FAST SWITCHING MOSFET

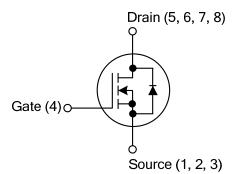
### DESCRIPTION

The UTC **UTM6016** is an N-Channel MOSFET, it uses UTC's advanced technology to provide customers with a minimum on-state resistance, high switching speed and low gate charge.

The UTC **UTM6016** is suitable for application in networking DC-DC power system and LCD/LED back light, etc.

### FEATURES

- \*  $R_{DS(ON)}$  < 12 m $\Omega$  @  $V_{GS}$  = 10V,  $I_{D}$ =8A
- $R_{DS(ON)}$  < 15 m $\Omega$  @ V<sub>GS</sub> = 4.5V, I<sub>D</sub>=6A
- \* Low gate charge
- \* Excellent CdV/dt effect decline
- \* High switching speed
- SYMBOL



# SOP-8

### ORDERING INFORMATION

Ordering Number	Package	Pin Assignment						Decking		
Ordering Number		1	2	3	4	5	6	7	8	Packing
UTM6016G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
UTM6016G-K08-5060-R	DFN-8(5×6)	S	S	S	G	D	D	D	D	Tape Reel
Noto: Din Assignment: C: Cate D: Drain	C: Couroo									

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

UTM6016G- <u>S08-R</u> UTM6016G-S08-R (1)Packing Type	(1) R: Tape Reel
(2)Package Type	(2) S08: SOP-8, K08-5060: DFN-8(5×6)
(3)Green Package	(3) G: Halogen Free and Lead Free

### MARKING

SOP-8	DFN-8(5×6)				
8 7 6 5   UTC □□□□ > Date Code   UTM6016G □□ > Lot Code   1 2 3 4	UTC UTM 6016 Lot Code				

### ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		V <sub>DSS</sub>	60	V	
Gate-Source Voltage		V <sub>GSS</sub>	±20	V	
	Continuous	T <sub>A</sub> =25°C		8	А
Drain Current V <sub>GS</sub> @ 10V (Note 1)	T <sub>A</sub> =70°C	ID	6.4	А	
Pulsed (Note 2)			I <sub>DM</sub>	32	А
Avalanche Current		I <sub>AS</sub>	38	А	
Single Pulse Avalanche Energy (Note 3)		E <sub>AS</sub>	123	mJ	
Power Dissipation (T <sub>A</sub> =25°C) (Note 4) $\frac{\text{SOP-8}}{\text{DFN-8}(5\times6)}$		Р	1.5	W	
		PD	1.92	W	
Junction Temperature		TJ	-55~+150	°C	
Storage Temperature Range		T <sub>STG</sub>	-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 CHARACTERISTICS (Note 1)

PARAMETER		SYMBOL	RATINGS	UNIT	
lunction to Ambient	SOP-8	ο	85	°C/W	
Junction to Ambient	DFN-8(5×6)	$\theta_{JA}$	65	C/W	
lunction to Coop	SOP-8	0	24	°C/W	
Junction to Case	DFN-8(5×6)	θ <sub>JC</sub>	12	C/W	

Notes: 1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

2. The data tested by pulsed, pulse width  $\leq$  300µs, duty cycle  $\leq$  2%.

3. The EAS data shows Max. rating. The test condition is  $V_{DD}$ =25V,  $V_{GS}$ =10V, L=3.85mH, I<sub>AS</sub>=8A.

4. The power dissipation is limited by 150°C junction temperature.



### ■ ELECTRICAL CHARACTERISTICS (TJ=25°C, unless otherwise noted)

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> =0V	60			V
BV <sub>DSS</sub> Temperature Coefficient	$\triangle BV_{DSS} / \triangle T$	Reference to 25°C , I <sub>D</sub> =1mA		0.052		V/°C
Drain Source Leekage Current		V <sub>DS</sub> =48V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C			1	μA
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =48V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C			5	μA
Cata Source Lookage Current	rd	V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V			+100	nA
Gate-Source Leakage Current Rever	se I <sub>GSS</sub>	V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V <sub>GS(TH)</sub>		1.2		2.5	V
V <sub>GS(TH)</sub> Temperature Coefficient	$ riangle V_{GS(TH)}$	-V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA		-5.76		mV/°C
Static Drain-Source On-State Resistand	e	V <sub>GS</sub> =10V, I <sub>D</sub> =8A		10	12	mΩ
(Note 2)	R <sub>DS(ON)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A		12	15	mΩ
Forward Transconductance	<b>g</b> fs	$V_{DS}$ =5V, $I_{D}$ =8A		45		S
DYNAMIC PARAMETERS						
Input Capacitance	C <sub>ISS</sub>			1070	1200	pF
Output Capacitance	C <sub>OSS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		200	220	рF
Reverse Transfer Capacitance	C <sub>RSS</sub>			190	210	pF
SWITCHING PARAMETERS (Note 2)						
Total Gate Charge (4.5V)	$Q_{G}$			290	310	nC
Gate to Source Charge	Q <sub>GS</sub>	$V_{GS}$ =10V, $V_{DS}$ =48V, $I_{D}$ =1A		10.7	15	nC
Gate to Drain Charge	$Q_{GD}$			30	45	nC
Turn-ON Delay Time	t <sub>D(ON)</sub>			55	70	ns
Rise Time	t <sub>R</sub>	V <sub>GS</sub> =10V, V <sub>DD</sub> =30V,		100	120	ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>	R <sub>G</sub> =3.3Ω, I <sub>D</sub> =2A		580	620	ns
Fall-Time	t <sub>F</sub>			190	210	ns
<b>GUARANTEED AVALANCHE CHARA</b>	CTERISTICS			-		
Single Pulse Avalanche Energy (Note 5	) E <sub>AS</sub>	V <sub>DD</sub> =25V, L=0.1mH, I <sub>AS</sub> =30A	77			mJ
DIODE CHARACTERISTICS		· · · · · · · · · · · · · · · · · · ·				
Continuous Source Current (Note 1, 6)	ls	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current			8	Α
Pulsed Source Current (Note 2, 6)	I <sub>SM</sub>				32	Α
Diode Forward Voltage (Note 2)	V <sub>SD</sub>	V <sub>GS</sub> =0V , I <sub>S</sub> =8A , T <sub>J</sub> =25°C			1.2	V
Reverse Recovery Time	trr			18		nS
Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> =8A, dl/dt=100A/µs, T <sub>J</sub> =25°C		15.6		nC

Notes: 1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

2. The data tested by pulsed, pulse width≤300µs, duty cycle≤2%.

3. The EAS data shows Max. rating. The test condition is  $V_{DD}$ =25V,  $V_{GS}$ =10V, L=0.1mH, I<sub>AS</sub>=30A.

4. The power dissipation is limited by 150°C junction temperature.

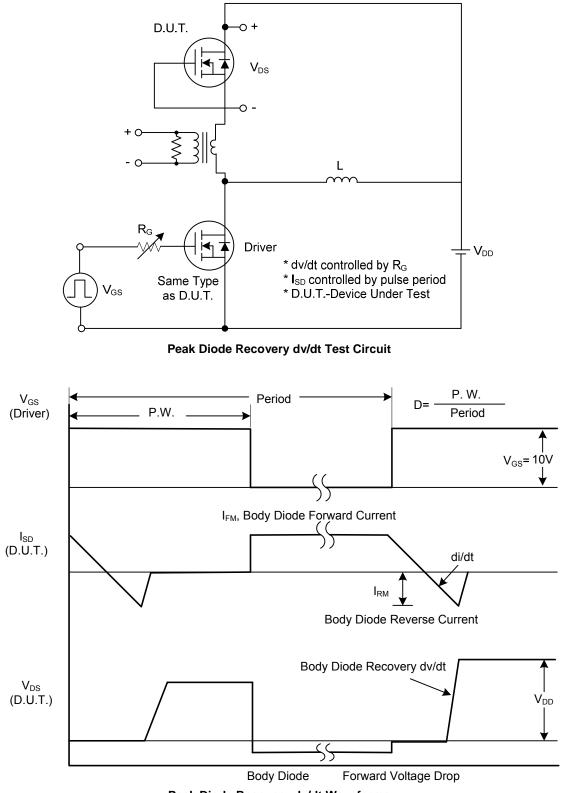
5. The Min. value is 100% EAS tested guarantee.

6. The data is theoretically the same as  $I_D$  and  $I_{DM}$ , in real applications, should be limited by total power dissipation.



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### TEST CIRCUITS AND WAVEFORMS

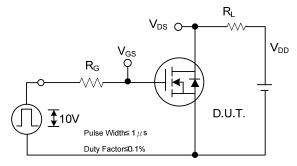


Peak Diode Recovery dv/dt Waveforms

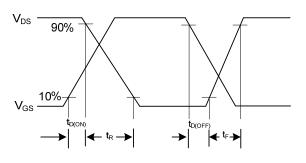


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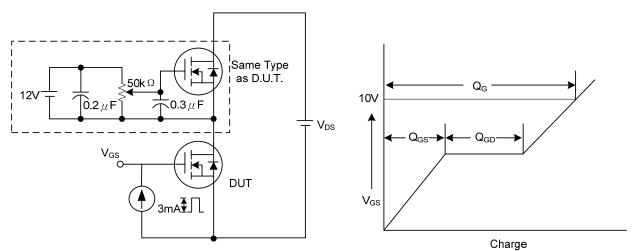
### ■ TEST CIRCUITS AND WAVEFORMS (Cont.)



Switching Test Circuit

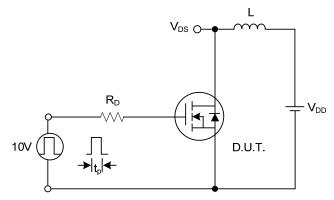


Switching Waveforms

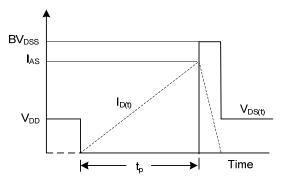


**Gate Charge Test Circuit** 





Unclamped Inductive Switching Test Circuit



**Unclamped Inductive Switching Waveforms** 



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