



UT48N12

POWER MOSFET

48A, 120V N-CHANNEL POWER MOSFET

■ DESCRIPTION

The UTC **UT48N12** is a N-channel enhancement MOSFET using UTC's advanced technology to provide the customers with perfect $R_{DS(ON)}$ and high switching speed.

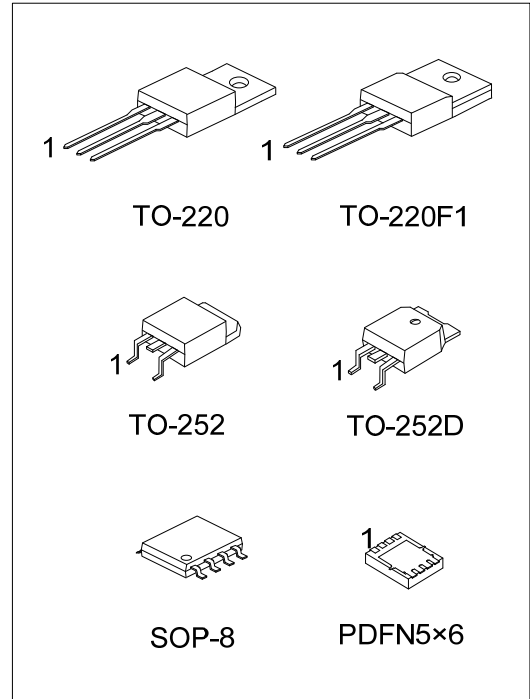
The UTC **UT60N06** is suitable for all commercial-industrial applications at power dissipation levels to approximately 50 watts, etc.

■ FEATURES

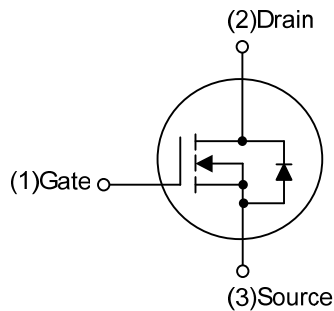
* $R_{DS(ON)} \leq 24 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=24\text{A}$

$R_{DS(ON)} \leq 32 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=24\text{A}$

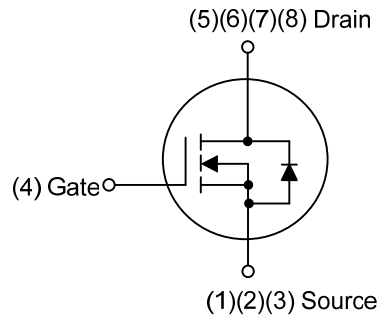
* High Switching Speed



■ SYMBOL



TO-220 / TO-220F1
TO-252 / TO-252D



SOP-8 / PDFN5x6

ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT48N12L-TA3-T	UT48N12G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UT48N12L-TF1-T	UT48N12G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
UT48N12L-TN3-R	UT48N12G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT48N12L-TND-R	UT48N12G-TND-R	TO-252D	G	D	S	-	-	-	-	-	Tape Reel
UT48N12L-S08-R	UT48N12G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
UT48N12L-P5060-R	UT48N12G-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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

UT48N12G-TA3-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TM3: TO-251 TN3: TO-252, S08: SOP-8, P5060: PDFN5×6 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING

PACKAGE	MARKING
TO-220 / TO-220F1 TO-252 / TO-252D	UTC UT48N12 1 Lot Code ← → Date Code L: Lead Free G: Halogen Free
SOP-8	8 7 6 5 UTC UT48N12 1 2 3 4 → Date Code L: Lead Free G: Halogen Free → Lot Code
PDFN5×6	UTC UT 48N12 1 Lot Code ← → Date Code

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

PARAMETER			SYMBOL	RATINGS	UNIT	
Drain-Source Voltage			V _{DSS}	120	V	
Gate-Source Voltage			V _{GSS}	±20	V	
Drain Current	Continuous	TO-220 TO-220F1 TO-252 TO-252D PDFN5X6	I _D	48	A	
		SOP-8		7	A	
		Pulsed (Note 2)	TO-220 TO-220F1 TO-252 TO-252D PDFN5X6	I _{DM}	96	A
	SOP-8		28		A	
	Avalanche Energy		Single Pulsed (Note 3)	E _{AS}	105	mJ
	Peak Diode Recovery dv/dt (Note 4)			dv/dt	6	V/ns
Power Dissipation	TO-220		P _D	120	W	
	TO-220F1			36	W	
	TO-252/TO-252D			48	W	
	SOP-8			6	W	
	PDFN5×6			18	W	
Junction Temperature			T _J	+150	°C	
Storage Temperature Range			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} = 46A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C

4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F1	θ _{JA}	62.5	°C/W
	TO-252/TO-252D		110	°C/W
	SOP-8		90	°C/W
	PDFN5×6		83	°C/W
Junction to Case	TO-220	θ _{JC}	1.04	°C/W
	TO-220F1		3.47	°C/W
	TO-252/TO-252D		2.6	°C/W
	SOP-8		20.8	°C/W
	PDFN5×6		6.9	°C/W

Note: The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

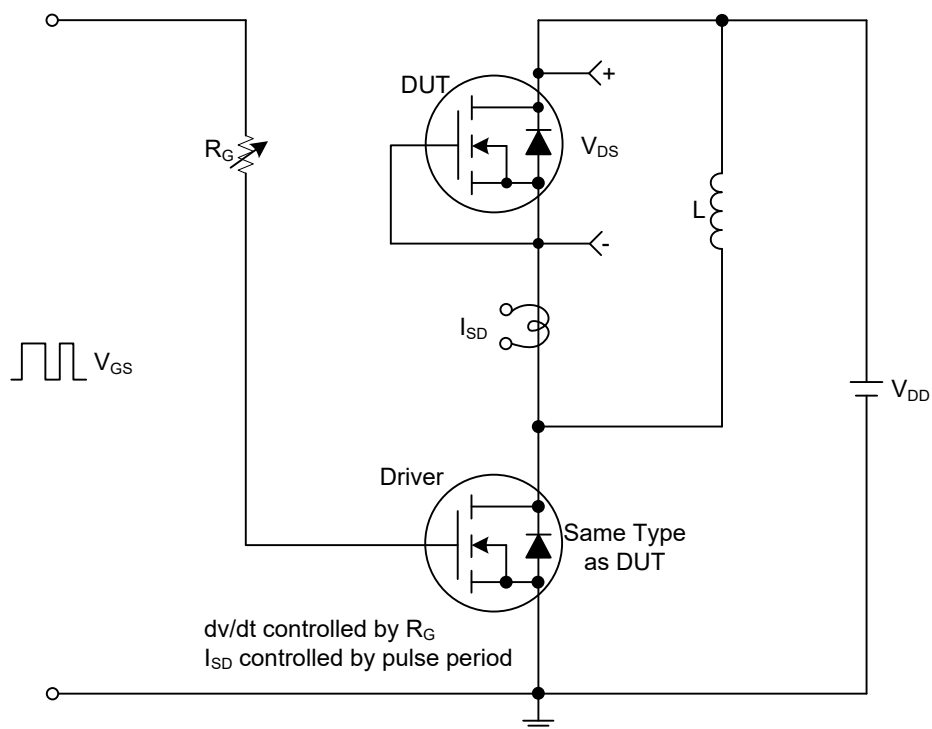
■ ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	120			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =120V, V _{GS} =0V			10	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 =24A			24	mΩ
			V _{GS} =4.5V, I _D =24A			32	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		4840		pF
Output Capacitance		C _{OSS}			270		pF
Reverse Transfer Capacitance		C _{RSS}			215		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =60V, V _{GS} =10V, I _D =48A, I _G =1mA (Note 1, 2)		113		nC
Gate to Source Charge		Q _{GS}			17		nC
Gate to Drain Charge		Q _{GD}			30		nC
Turn-on Delay Time (Note 1)		t _{D(ON)}	V _{DD} =60V, V _{GS} =10V, I _D =48A, R _G =3Ω (Note 1, 2)		20		ns
Rise Time		t _R			21		ns
Turn-off Delay Time		t _{D(OFF)}			54		ns
Fall-Time		t _F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				48	A
Maximum Body-Diode Pulsed Current		I _{SM}				96	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =48A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =48A, V _{GS} =0V,		75		nS
Reverse Recovery Charge		Q _{rr}	dl _F /dt =100A/μs		0.38		nC

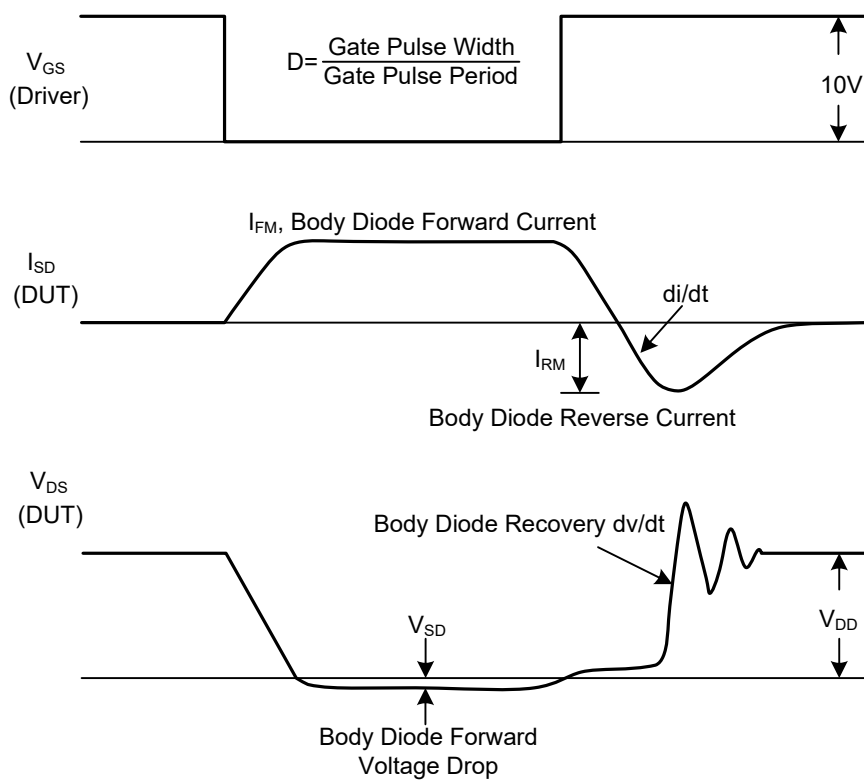
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS



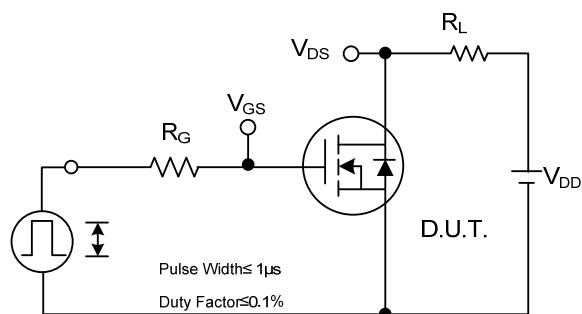
Peak Diode Recovery dv/dt Test Circuit



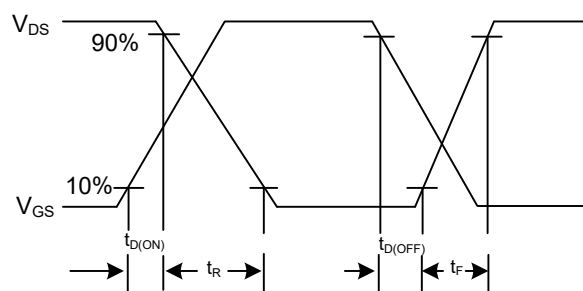
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

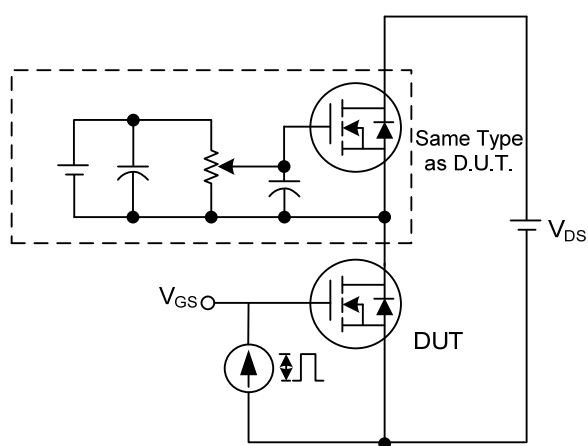
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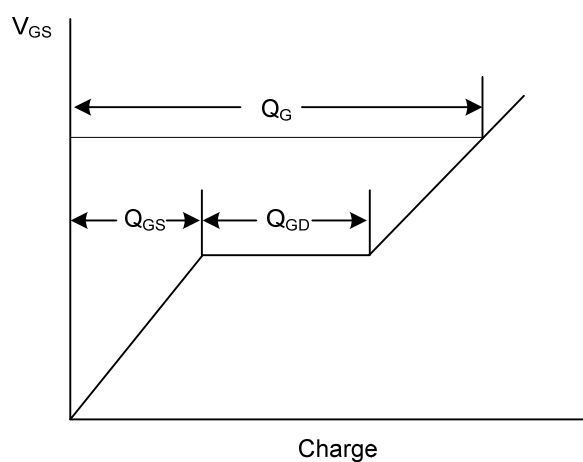
Switching Test Circuit



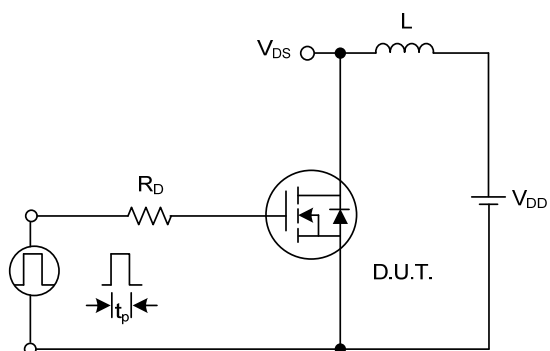
Switching Waveforms



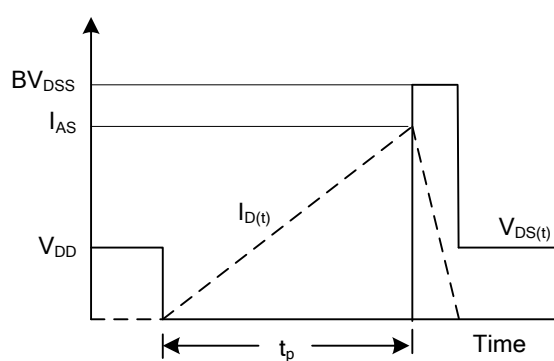
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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