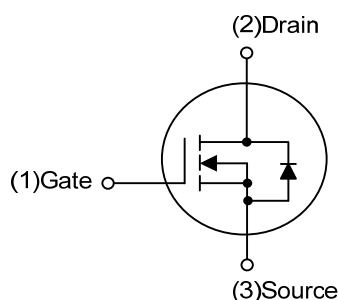


**UNA04R060M****Power MOSFET****70A, 40V N-CHANNEL
POWER MOSFET****DESCRIPTION**

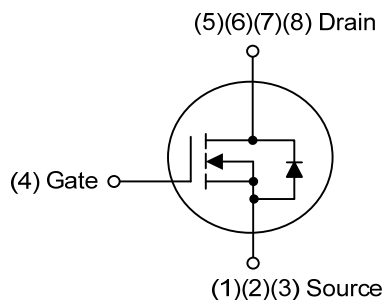
The UTC **UNA04R060M** is a N-channel enhancement mode power field effect transistors with stable off-state characteristics, fast switching speed, low thermal resistance, usually used at telecom and computer application.

FEATURES

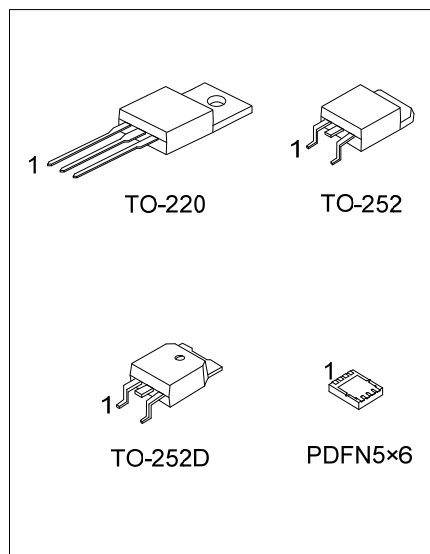
- * $R_{DS(ON)} \leq 6.0 \text{ m}\Omega$ @ $V_{GS} = 10\text{V}$, $I_D = 20\text{A}$
- * $R_{DS(ON)} \leq 8.0 \text{ m}\Omega$ @ $V_{GS} = 4.5\text{V}$, $I_D = 20\text{A}$
- * Fast switching capability
- * Avalanche energy specified

SYMBOL

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



PDFN5×6

**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UNA04R060ML-TA3-T	UNA04R060MG-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UNA04R060ML-TN3-R	UNA04R060MG-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UNA04R060ML-TND-R	UNA04R060MG-TND-R	TO-252D	G	D	S	-	-	-	-	-	Tape Reel
UNA04R060ML-P5060-R	UNA04R060MG-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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

UNA04R060MG-TA3-R		(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TN3: TO-252, TND: TO-252D, P5060: PDFN5×6 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING

TO-220 / TO-252 / TO-252D	PDFN5×6
UTC UNA 04R060M□ □□□□□□ Lot Code ← → Date Code L: Lead Free G: Halogen Free 1	UTC UNA 04R060M • □□□□□□ Lot Code ← → Date Code

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V _{DSS}	40	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current	T _C = 25°C	TO-220	I _D	70	A
		TO-252			
	TO-252D				
	PDFN5×6	50		A	
	T _C = 100°C	TO-220		42	A
TO-252					
TO-252D					
		PDFN5×6	30	A	
Drain Current Pulsed (Note 2)		TO-220	I _{DM}	210	A
		TO-252			
		TO-252D			
		PDFN5×6	150	A	
Avalanche Energy	Single Pulsed (Note 3)		E _{AS}	80	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	10	V/ns
Power Dissipation		TO-220	P _D	110	W
		TO-252		50	W
		TO-252D			
		PDFN5×6			
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. Repeativity rating: pulse width limited by junction temperature.

3. $L=0.1\text{mH}$, $I_{AS}=40\text{A}$, $V_{DD}=25\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

4. $I_{SD}\leq 48\text{A}$, $di/dt\leq 300\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

■ THERMAL DATA (Note)

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-252		110	$^\circ\text{C}/\text{W}$
	TO-252D		35	$^\circ\text{C}/\text{W}$
	PDFN5×6		1.14	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	2.5	$^\circ\text{C}/\text{W}$
	TO-252		4.1	$^\circ\text{C}/\text{W}$
	TO-252D			
	PDFN5×6			

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

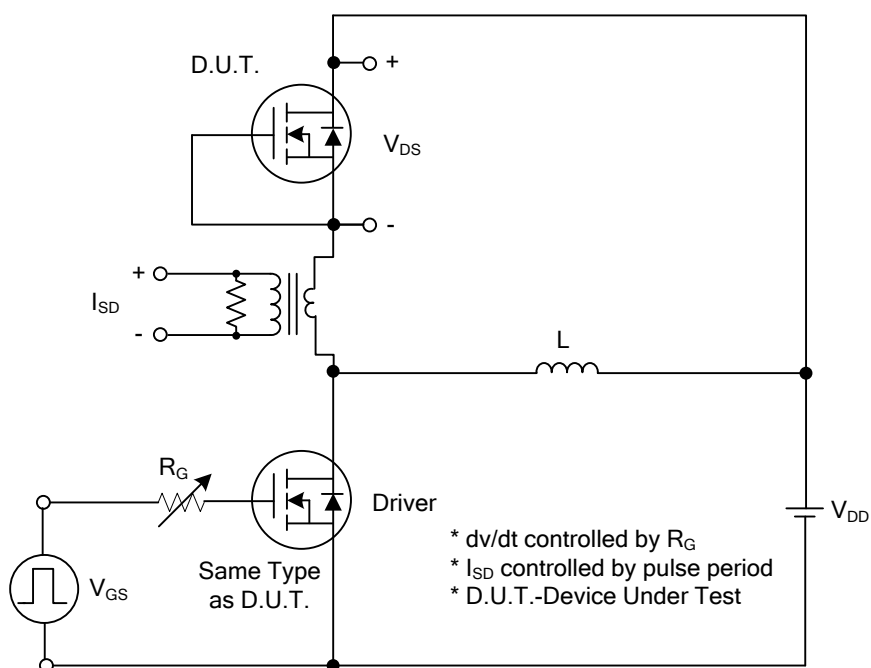
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	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} =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	1.6	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 _{GS} =0V, V _{DS} =25V, f=1MHz		5509		pF
Output Capacitance		C _{OSS}			440		pF
Reverse Transfer Capacitance		C _{RSS}			280		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge		Q _G	V _{DS} =30V, V _{GS} =10V, I _D =1.3A, I _D =100μA (Note 1, 2)		189		nC
Gate-Source Charge		Q _{GS}			10		nC
Gate-Drain Charge (Miller Charge)		Q _{GD}			12.8		nC
Turn-On Delay Time		t _{D(ON)}	V _{DD} =20V, V _{GS} =10V, I _D =0.5A (Note 1, 2)		100		ns
Turn-On Rise Time		t _R			133		ns
Turn-Off Delay Time		t _{D(OFF)}			780		ns
Turn-Off Fall Time		t _F			300		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				70	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				210	A
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _S =20A			1.0	V
Reverse Recovery Time		t _{rr}	V _{GS} =0V, I _S =20A		2.67		ns
Reverse Recovery Charge		Q _{rr}	dI _F /dt=100A/μs		0.16		μC

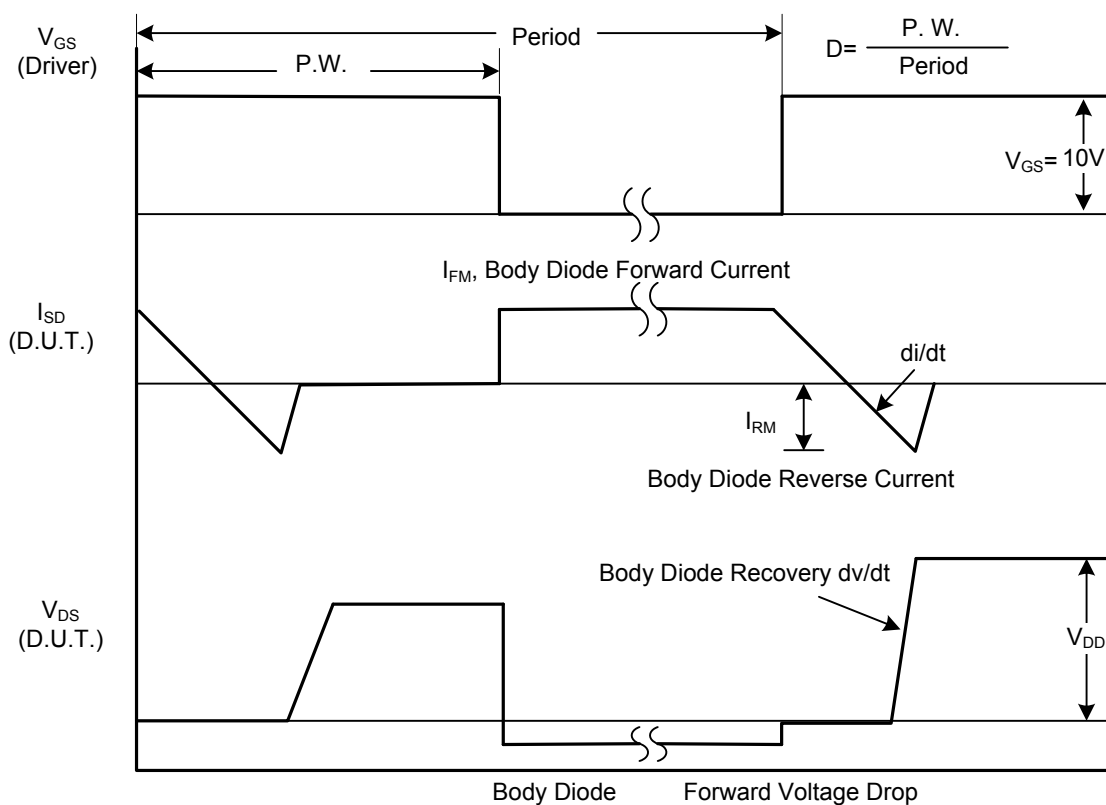
Notes: 1. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



1A Peak Diode Recovery dv/dt Test Circuit



1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS

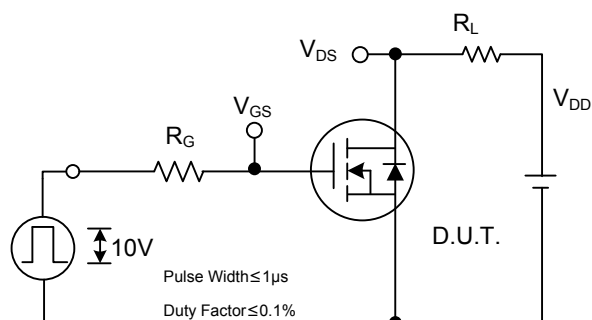


Fig. 2A Switching Test Circuit

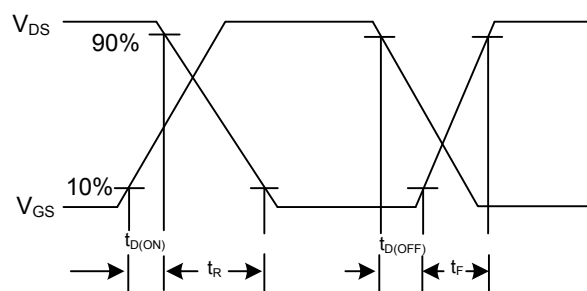


Fig. 2B Switching Waveforms

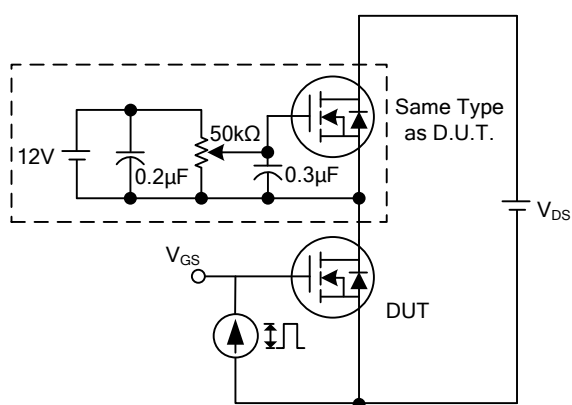


Fig. 3A Gate Charge Test Circuit

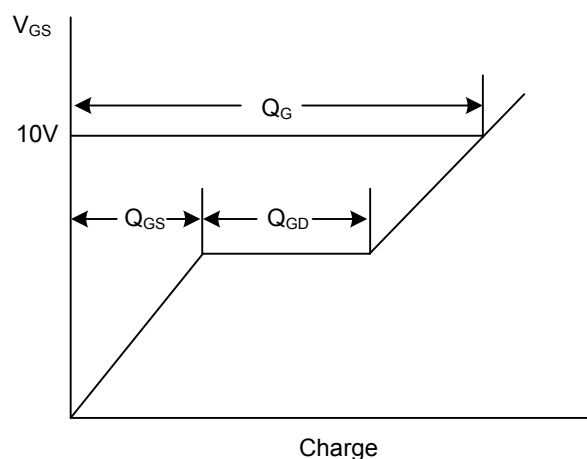


Fig. 3B Gate Charge Waveform

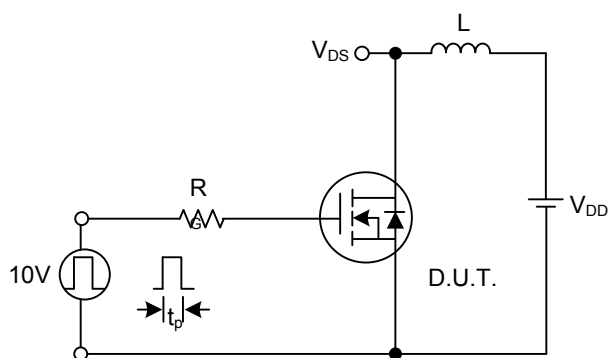


Fig. 4A Unclamped Inductive Switching Test Circuit

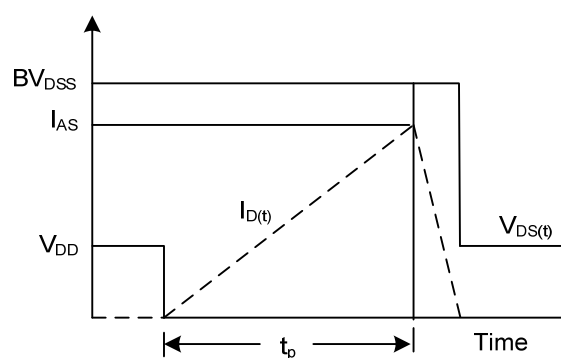


Fig. 4B Unclamped Inductive Switching Waveforms

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