



**UNA06R165M**

Advance

**POWER MOSFET**

**60A, 60V N-CHANNEL  
ENHANCEMENT MODE  
TRENCH POWER MOSFET**

■ DESCRIPTION

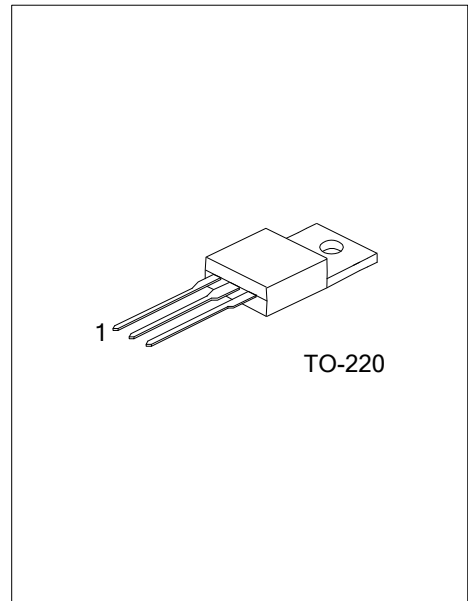
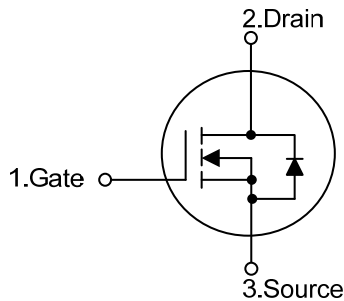
The UTC **UNA06R165M** is an N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with high switching speed and low on-state resistance, etc.

The UTC **UNA06R165M** is suitable for DC motor control, UPS, Class D amplifier, etc.

■ FEATURES

- \*  $R_{DS(ON)} < 16.5m\Omega @ V_{GS}=10V, I_D=60A$
- \* High power and current handling capability
- \* High speed switching
- \* Low gate charge

■ SYMBOL



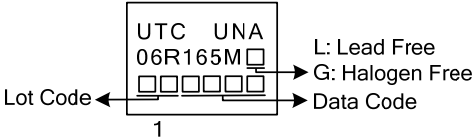
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UNA06R165ML-TA3-T	UNA06R165MG-TA3-T	TO-220	G	D	S	Tube

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

UNA06R165ML-TA3-R	(1)Packing Type	(1) R: Tape Reel
	(2)Package Type	(2) TA3: TO-220
	(3)Green Package	(3) L: Lead Free, G: Halogen Free and Lead Free

MARKING



■ ABSOLUTE MAXIMUM RATING ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		$V_{DSS}$	60	V	
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V	
Drain Current	Continuous (Note 2)	$I_D$	$T_C=25^\circ\text{C}, V_{GS}@10\text{V}$	60	A
			$T_C=100^\circ\text{C}, V_{GS}@10\text{V}$	43	A
	Pulsed(Note 3)		$I_{DM}$	241	A
Avalanche Current		$I_{AS}$	60	A	
Avalanche Energy (Note4)		$E_{AS}$	500	mJ	
Power Dissipation	$T_C=25^\circ\text{C}$		$P_D$	150	W
	Derate above $25^\circ\text{C}$			1.0	W/ $^\circ\text{C}$
Junction Temperature		$T_J$	150	$^\circ\text{C}$	
Storage Temperature Range		$T_{STG}$	-55~+150	$^\circ\text{C}$	

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. Current limited by bond wire.

3. Repetitive rating: Pulse width limited by maximum junction temperature.

4.  $L=0.14\text{mH}$ ,  $I_{AS}=60\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J = 25^\circ\text{C}$

5.  $I_{SD} \leq 60\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 175^\circ\text{C}$

■ THERMAL RESISTANCES CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to ambient	steady state	$\theta_{JA}$	62	$^\circ\text{C}/\text{W}$
Junction to Case	steady state	$\theta_{JC}$	1.0	$^\circ\text{C}/\text{W}$

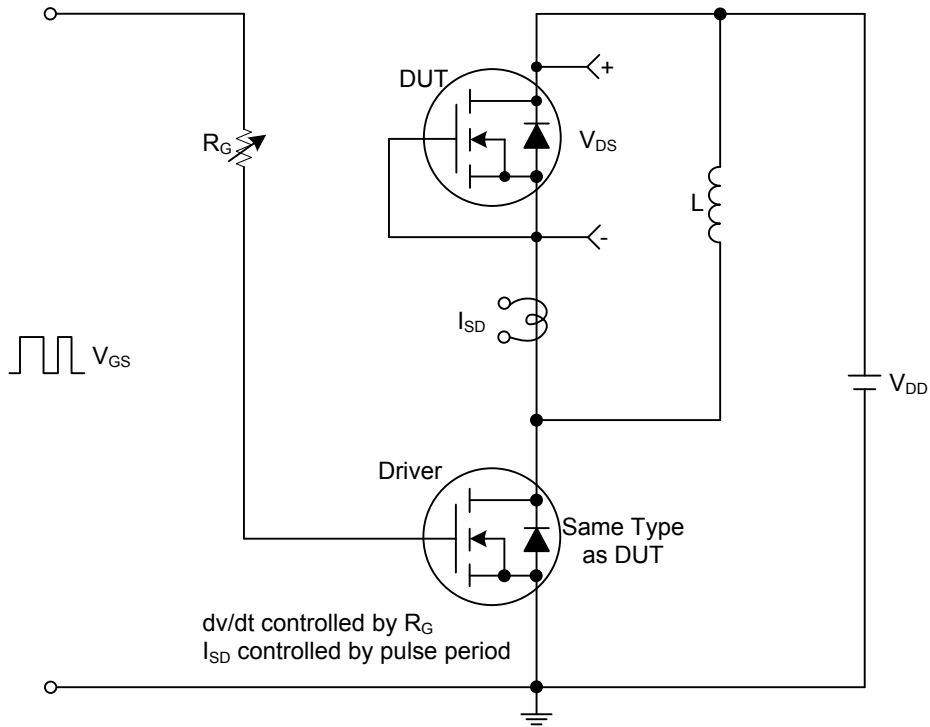
■ ELECTRICAL CHARACTERISTICS (T<sub>A</sub> =25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT		
<b>OFF CHARACTERISTICS</b>								
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	60			V		
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V			1	μA		
		V <sub>DS</sub> =48V, T <sub>J</sub> =150°C			50	μA		
Gate-Source Leakage Current	Forward	I <sub>GSS</sub>						
	Reverse						V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V	+100
						V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V	-100	nA
<b>ON CHARACTERISTICS</b>								
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	2.4	3.0	V		
Static Drain-Source On-State Resistance (Note 1)	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =60A			16.5	mΩ		
Forward Transconductance(Note 1)	g <sub>FS</sub>	V <sub>DD</sub> =15V, I <sub>D</sub> =60A		36		S		
<b>DYNAMIC PARAMETERS</b>								
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		1430		pF		
Output Capacitance	C <sub>OSS</sub>			420		pF		
Reverse Transfer Capacitance	C <sub>RSS</sub>			88		pF		
<b>SWITCHING PARAMETERS</b>								
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =1.3A (Note 1, 2)		37.5		nC		
Gate to Source Charge	Q <sub>GS</sub>			8.3		nC		
Gate to Drain Charge	Q <sub>GD</sub>			9.5		nC		
Turn-on Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =30V, I <sub>D</sub> =0.5A, R <sub>G</sub> =25Ω (Note 1, 2)		12		ns		
Rise Time	t <sub>R</sub>			64		ns		
Turn-off Delay Time	t <sub>D(OFF)</sub>			70		ns		
Fall-Time	t <sub>F</sub>			38		ns		
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>								
Maximum Body-Diode Continuous Current	I <sub>S</sub>	Integral p-n diode in MOSFET			60	A		
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				240	A		
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =60A, V <sub>GS</sub> =0V		0.85	1.5	V		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	I <sub>S</sub> =60A, di <sub>S</sub> /dt=100A/μs		55		ns		
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>				110		nC	

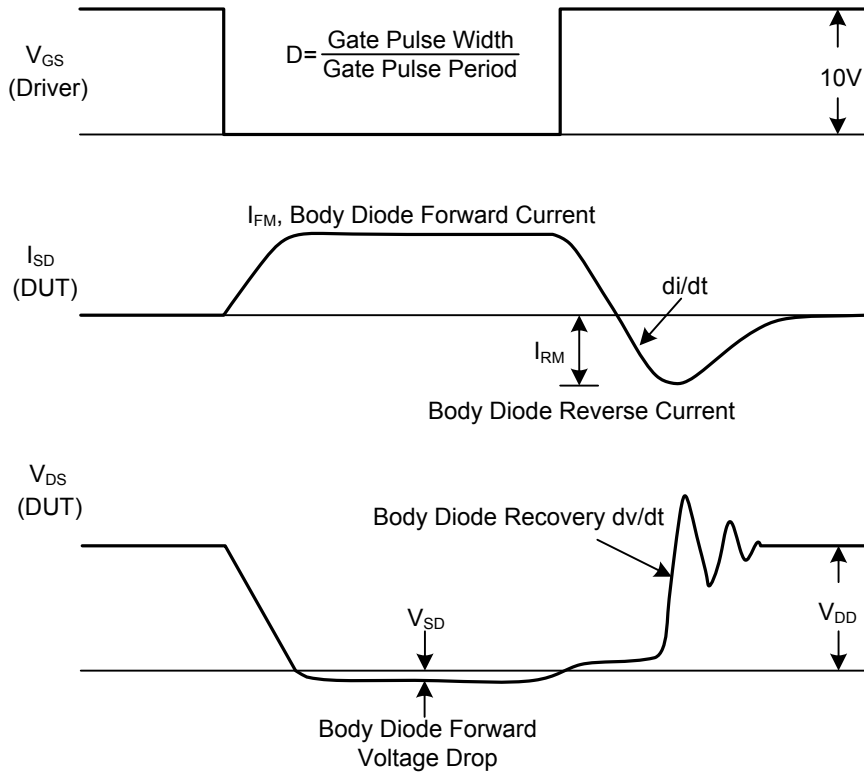
Notes: 1. Pulse test: pulse width ≤ 300us, duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



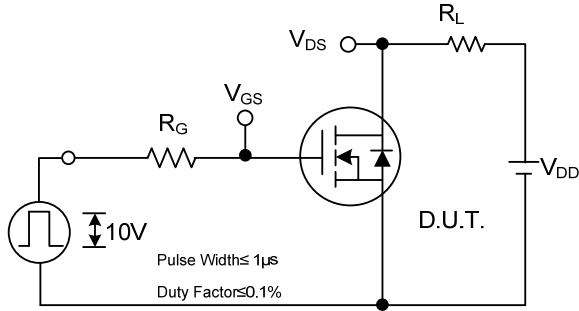
Peak Diode Recovery dv/dt Test Circuit



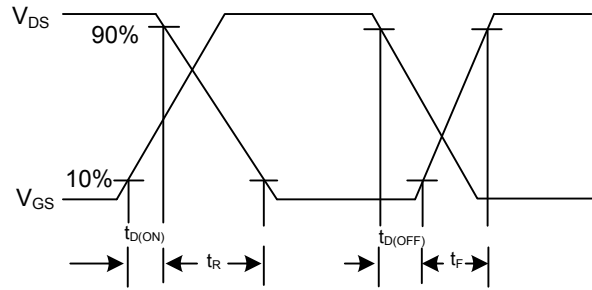
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

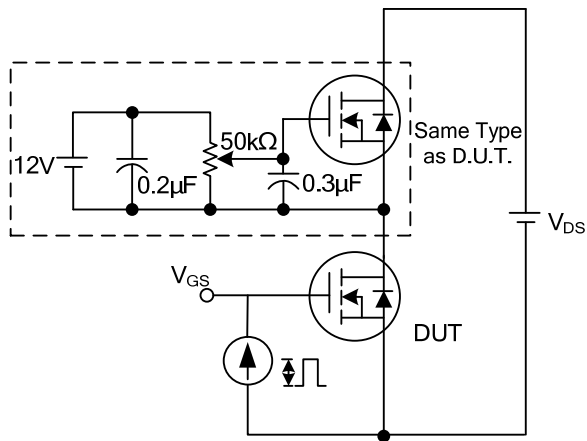
■ TEST CIRCUITS AND WAVEFORMS



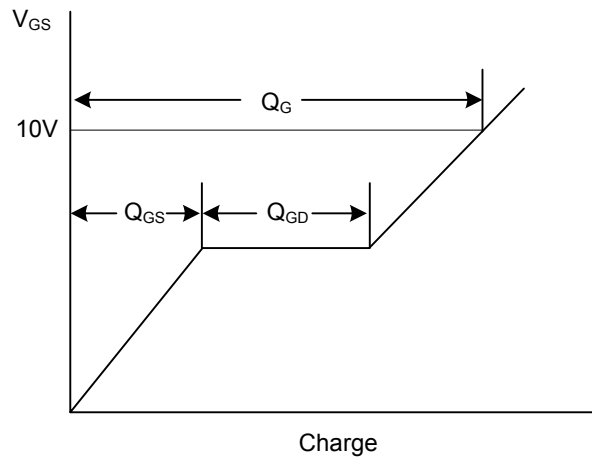
Switching Test Circuit



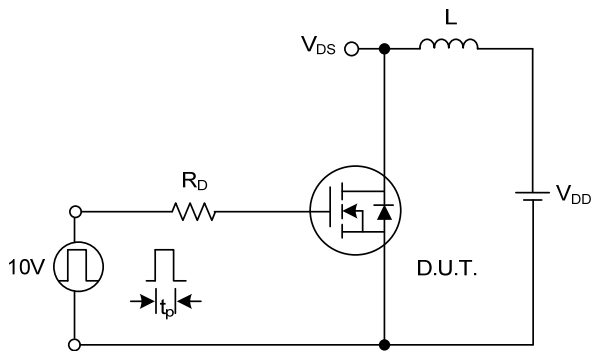
Switching Waveforms



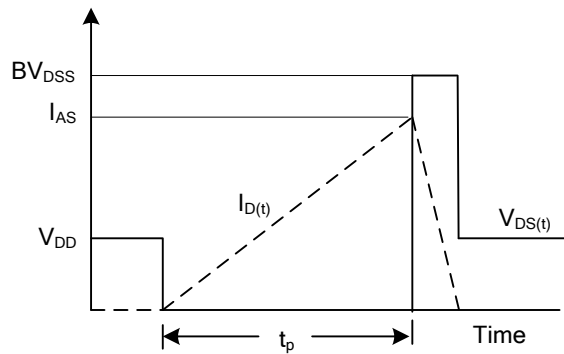
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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