

UNISONIC TECHNOLOGIES CO., LTD

60NM50 Preliminary Power MOSFET

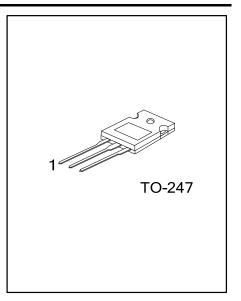
60A, 500V N-CHANNEL SUPER-JUNCTION MOSFET

■ DESCRIPTION

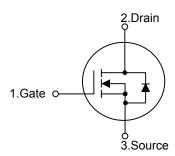
The **UTC 60NM50** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at DC-DC, AC-DC converters for power applications.

■ FEATURES

- * $R_{DS(ON)}$ < 55m Ω @ V_{GS} =10V, I_{D} =30A
- * High Switching Speed
- * 100% Avalanche Tested



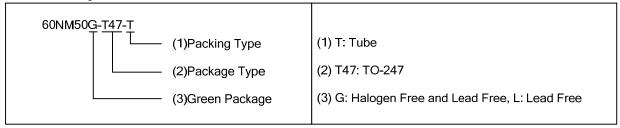
■ SYMBOL



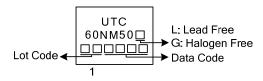
ORDERING INFORMATION

Ordering Number		Doolsons	Pin Assignment			Deelsing	
Lead Free	Halogen Free	Package	1	2	3	Packing	
60NM50L-T47-T	60NM50G-T47-T	TO-247	G	D	S	Tube	

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



■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DSS}	500	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	Continuous	I_D	60	Α
	Pulsed (Note 2)	I _{DM}	240	Α
Avalanche Current (Note 2)		I _{AR}	20	Α
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	2400	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	14	V/ns
Power Dissipation		P_D	390	W
Junction Temperature		TJ	+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 = 12mH, I_{AS} = 20A, V_{DD} = 50V, R_G = 25 Ω , Starting T_J = 25 $^{\circ}$ C
- 4. $I_{SD} \le 30A$, di/dt $\le 200A/\mu s$, $V_{DD} \le BV_{DSS}$, Starting $T_J = 25^{\circ}C$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT	
Junction to Ambient	θ_{JA}	62	°C/W	
Junction to Case	$\theta_{ m JC}$	0.32	°C/W	

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

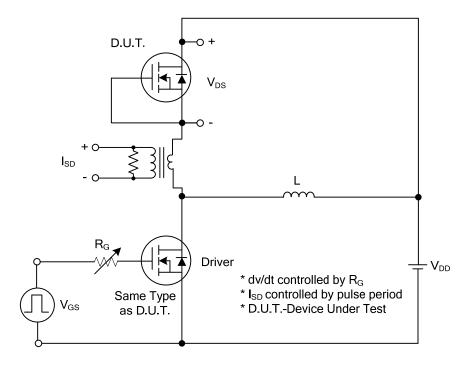
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PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS	-		1				
Drain-Source Breakdown Voltage		BV _{DSS}	$I_D=250\mu A, V_{GS}=0V$	500			V
Drain-Source Leakage Current		I_{DSS}	V _{DS} =500V, V _{GS} =0V			10	μΑ
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS} =+30V, V_{DS} =0V			+100	nA
	Reverse	igss	V_{GS} =-30V, V_{DS} =0V			-100	nA
ON CHARACTERISTICS					-		_
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu A$	2.5		4.5	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =30A			55	mΩ
DYNAMIC PARAMETERS		-				ā.	
Input Capacitance		C _{ISS}			4450		pF
Output Capacitance		Coss	V_{GS} =0V, V_{DS} =25V, f=1.0MHz		3400		pF
Reverse Transfer Capacitance		C _{RSS}			41		pF
SWITCHING PARAMETERS		-				ā.	
Total Gate Charge (Note 1)		Q_G	V _{DS} =50V, I _D =1.3A, I _G =100μA		498		nC
Gate to Source Charge		Q_{GS}	V _{GS} =10V (Note 1,2)		28		nC
Gate to Drain Charge		Q_GD	VGS=10V (140tC 1,2)		118		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$			176		ns
Rise Time		t_R	V_{DD} =30V, I_{D} =0.5A, R_{G} =25 Ω ,		600		ns
Turn-OFF Delay Time		$t_{D(OFF)}$	V _{GS} =10V (Note 1,2)		1430		ns
Fall-Time		t_{F}			1060		ns
SOURCE- DRAIN DIODE RATIN	IGS AND CH	ARACTERIS	TICS			ā.	
Maximum Body-Diode Continuous Current		Is				60	Α
Maximum Body-Diode Pulsed Current		I _{SM}				240	Α
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I _S =30A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t _{rr}	I _S =30A, V _{GS} =0V,		600		ns
Body Diode Reverse Recovery C	harge	Q _{rr}	dI _F /dt=100A/μs		12.1		μC

Notes: 1. Pulse Test : Pulse width \leq 300 μ s, Duty cycle \leq 2%.

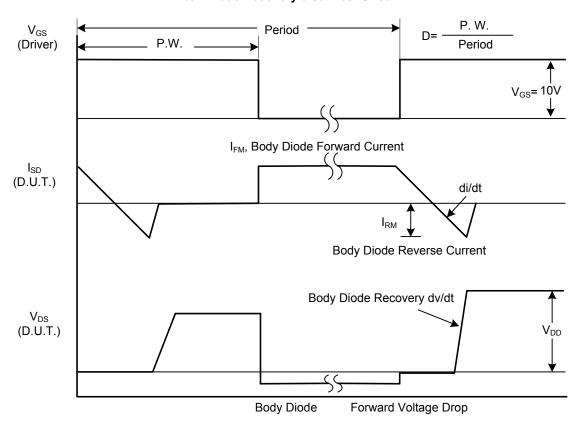
2. Essentially independent of operating ambient temperature.



■ TEST CIRCUITS AND WAVEFORMS



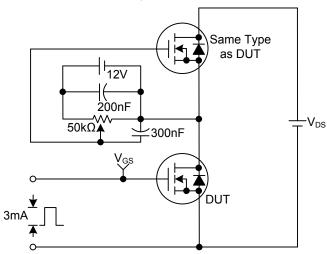
Peak Diode Recovery dv/dt Test Circuit



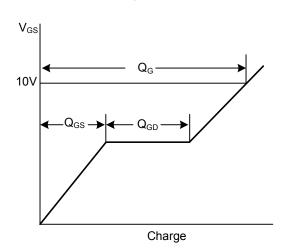
Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

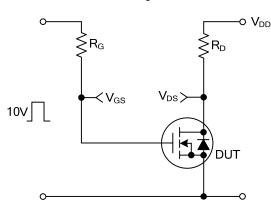
Gate Charge Test Circuit



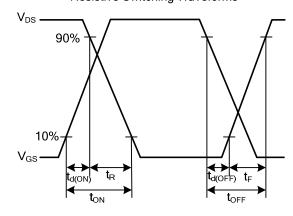
Gate Charge Waveforms



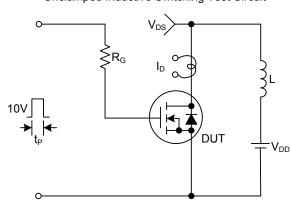
Resistive Switching Test Circuit



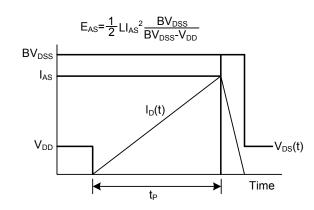
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



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