

UNISONIC TECHNOLOGIES CO., LTD

11NM50

Preliminary

11A, 500V N-CHANNEL SUPER-JUNCTION MOSFET

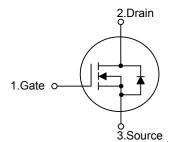
DESCRIPTION

The **UTC 11NM50** 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

- * $R_{DS(ON)}$ < 0.32 Ω @ V_{GS} =10V, I_{D} =5.5A
- * High switching Speed
- * 100% avalanche tested
- * Improved dv/dt capability

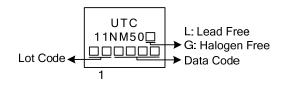
SYMBOL



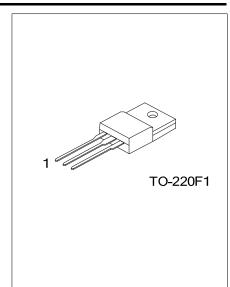
ORDERING INFORMATION

Ordering Number		Backago	Pin Assignment			Decking	
Lead Free	Halogen Free	Package	1	2	3	Packing	
11NM50L-TF1-T	11NM50G-TF1-T	TO-220F1	G	D	S	Tube	
Note: Pin Assignment: G: Gate D: Drain S: Source							
11NM50 <u>L</u> - <u>TF1</u> -T	 (1) T: Tube (2) TF1: TO-220F1 (3) L: Lead Free, G: Halogen Free and Lead Free 						

MARKING







■ ABSOLUTE MAXIMUM RATINGS (Tc=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	11	А
	Pulsed (Note 2)	I _{DM}	44	А
Avalanche Current (Note 2)		I _{AR}	6.5	А
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	297	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	5.2	V/ns
Power Dissipation		PD	40	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 = 22mH, I_{AS} = 5.2A, V_{DD} = 50V, R_G = 25 Ω , Starting T_J = 25°C

4. $I_{SD} \le 11A$, di/dt $\le 200A/\mu$ s, $V_{DD} \le BV_{DSS}$, Starting $T_J = 25^{\circ}C$

■ THERMAL RESISTANCES CHARACTERISTICS

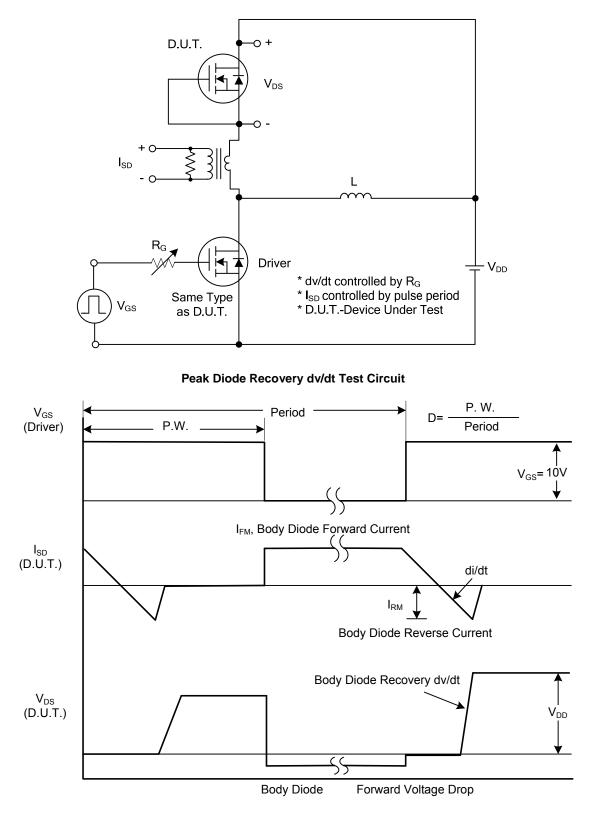
PARAMETER	SYMBOL	RATINGS	UNIT	
Junction to Ambient	θ _{JA}	62.5	°C/W	
Junction to Case	θις	3.1	°C/W	

■ ELECTRICAL CHARACTERISTICS (T_J=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	500			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =500V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	Forward	1	V _{DS} =0V ,V _{GS} =30V			+100	nA
	Reverse	I _{GSS}	V _{DS} =0V ,V _{GS} =-30V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} = V _{GS} , I _D =250µA			4.5	V
Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =5.5A			0.32	Ω
DYNAMIC PARAMETERS							
Input Capacitance	iput Capacitance				755		рF
Output Capacitance		Coss	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		630		рF
Reverse Transfer Capacitance		C _{RSS}			62		рF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_{G}			75		nC
Gate to Source Charge		Q_{GS}	V _{DS} =50V, V _{GS} =10V, I _D =1.3A , I _G =100µA (Note 1, 2)		5.5		nC
Gate to Drain Charge		Q_{GD}	$IG = 100 \mu A (100 e^{-1}, 2)$		23.5		nC
Turn-ON Delay Time (Note 1)		t _{D(ON)}			58		ns
Rise Time		t _R	V_{DD} =30V, V_{GS} =10V, I_{D} =0.5A,		139		ns
Turn-OFF Delay Time		t _{D(OFF)}	R _G =25Ω (Note 1, 2)		218		ns
Fall-Time		t _F			174		ns
SOURCE- DRAIN DIODE RATIN	IGS AND CHA	ARACTERIS	FICS				
Maximum Body-Diode Pulsed Current		Is				11	Α
Drain-Source Diode Forward Voltage (Note 1)		I _{SM}				44	А
Maximum Body-Diode Continuous Current		V_{SD}	I _S =11A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t _{rr}	I _S =11A, V _{GS} =0V,		330		ns
Body Diode Reverse Recovery Charge		Qrr	dI _F /dt=100A/µs		4.4		μC
Notes: 1. Pulse Test : Pulse widt	h ≤ 300µs, Dut	y cycle ≤ 2%	:				

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS





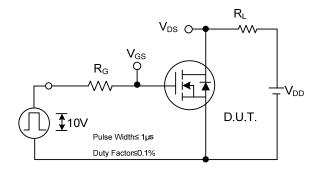


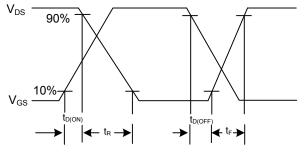
 V_{GS}

10V

Q_{GS}

■ TEST CIRCUITS AND WAVEFORMS (Cont.)



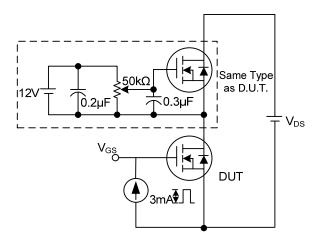


Switching Test Circuit

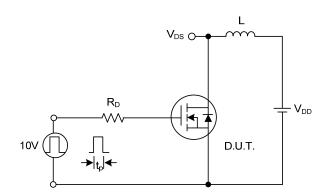


 Q_G

 Q_{GD}



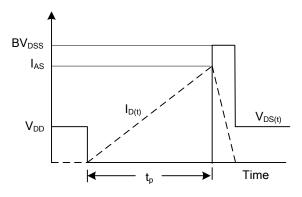
Gate Charge Test Circuit



Unclamped Inductive Switching Test Circuit

Gate Charge Waveform

Charge



Unclamped Inductive Switching Waveforms



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