



11A, 400V N-CHANNEL SUPER-JUNCTION MOSFET

DESCRIPTION

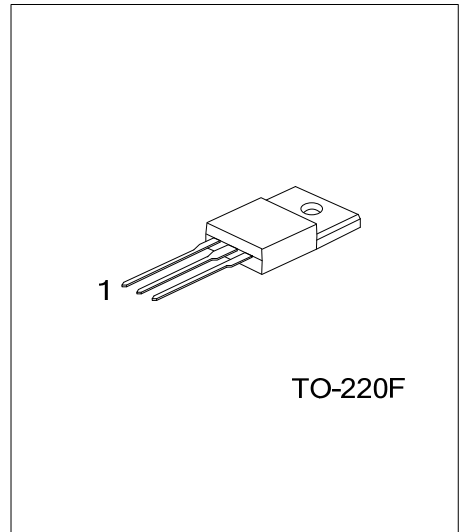
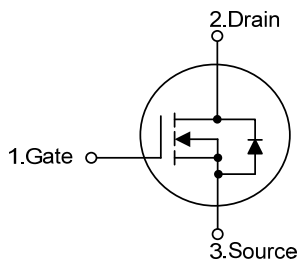
The UTC **11NM40** is an Super Junction MOSFET Structure . It uses UTC advanced planar stripe, DMOS technology to provide customers perfect switching performance, minimal on-state resistance.

The UTC **11NM40** is universally applied in electronic lamp ballasts based on half bridge topology, high efficiency switched mode power supplies, active power factor correction, etc.

FEATURES

- * $R_{DS(ON)} < 0.38\Omega$ @ $V_{GS}=10V$, $I_D=5.7A$
- * High switching speed
- * Low effective output capacitance (Typ.=95pF)
- * Low gate charge (Typ.=40nC)

SYMBOL



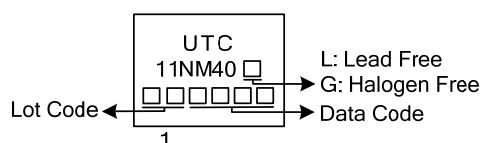
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
11NM40L-TF3-T	11NM40G-TF3-T	TO-220F	G	D	S	Tube

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

SF11N40L-TF3-T	(1)Packing Type	(1) T: Tube
	(2)Package Type	(2) TF3: TO-220F
	(3)Green Package	(3) L: Lead Free, G: Halogen Free and Lead Free

MARKING



■ **ABSOLUTE MAXIMUM RATINGS** ($T_C=25^\circ\text{C}$ unless otherwise noted)

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V _{DSS}	400	V
Gate-Source Voltage			V _{GSS}	±30	V
Drain Current	Continuous	T _C =25°C	I _D	11.6	A
		T _C =100°C		7	A
	Pulsed (Note 1)		I _{DM}	33	A
Avalanche Current (Note 1)			I _{AR}	11	A
Single Pulsed Avalanche Energy (Note 2)			E _{AS}	154	mJ
Repetitive Avalanche Energy (Note 1)			E _{AR}	12.5	mJ
Peak Diode Recovery dv/dt (Note 3)			dv/dt	4.5	V/ns
Total Power Dissipation	T _C =25°C		P _D	125	W
	Derate above 25°C			1.0	W/°C
Operating Temperature Range			T _J	-55~+150	°C
Storage Temperature Range			T _{STG}	-55~+150	°C
Maximum Lead Temperature for Soldering Purposes, 1/8" from Case for 5 Seconds			T _L	300	°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. $L = 2.3\text{mH}$, $I_{AS} = 11.6\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 11.6\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL CHARACTERISTICS**

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	1.0	$^\circ\text{C}/\text{W}$

■ **ELECTRICAL CHARACTERISTICS** ($T_C=25^\circ\text{C}$ unless otherwise noted)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA, T _J =25°C	400			V
Breakdown Voltage Temperature Coefficient		ΔBV _{DSS} /ΔT _J	I _D =250μA, Referenced to 25°C		0.6		V/°C
Drain-Source Avalanche Breakdown Voltage		BV _{DS}	V _{GS} =0V, I _D =11A		700		V
Zero Gate Voltage Drain Current		I _{DSS}	V _{DS} =400V, V _{GS} =0V			1	μA
			V _{DS} =320V, T _C =125°C			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =+30V, V _{DS} =0V			+100	nA
	Reverse		V _{GS} =-30V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	3.0		5.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{DS} =10V, I _D =5.7A		0.32	0.38	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		1148	1490	pF
Output Capacitance		C _{OSS}			671	870	pF
Reverse Transfer Capacitance		C _{RSS}			63	82	pF
Output Capacitance		C _{OSS}	V _{GS} =0V, V _{DS} =320V, f=1.0MHz		35		pF
Effective Output Capacitance		C _{OSS eff}	V _{DS} =0V~320V, V _{GS} =0V		95		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{GS} =10V, V _{DS} =320V, I _D =11A (Note 4, 5)		40	52	nC
Gate to Source Charge		Q _{GS}			7.2		nC
Gate to Drain Charge		Q _{GD}			21		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =200V, I _D =11A, R _G =25Ω (Note 4, 5)		55	80	ns
Rise Time		t _R			115	205	ns
Turn-OFF Delay Time		t _{D(OFF)}			330	400	ns
Fall-Time		t _F			140	180	ns
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				11.6	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				33	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =11.6A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time		t _{RR}	I _S =11.6A, V _{GS} =0V,		390		ns
Body Diode Reverse Recovery Charge		Q _{RR}	dl _F /dt=100A/μs (Note 4)		5.7		μC

Notes: 1. Repetitive Rating : Pulse width limited by maximum junction temperature.

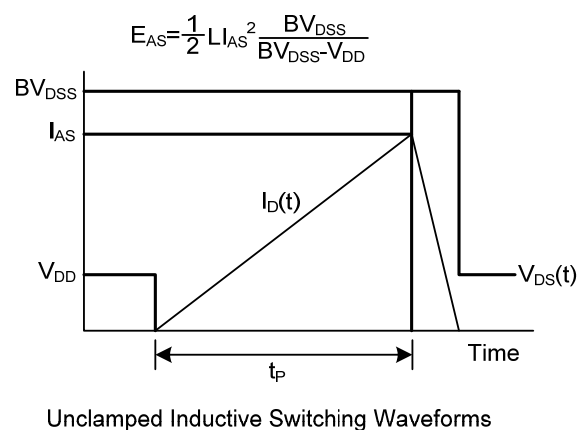
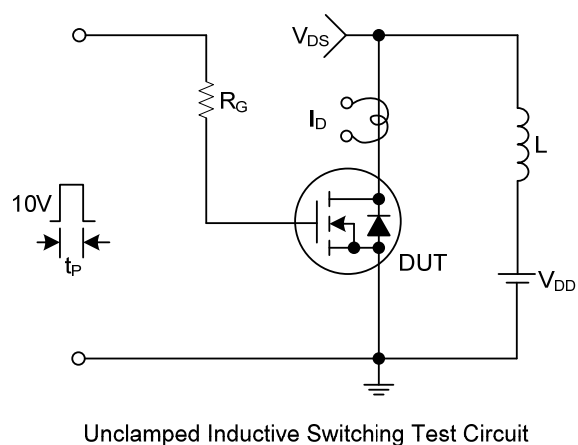
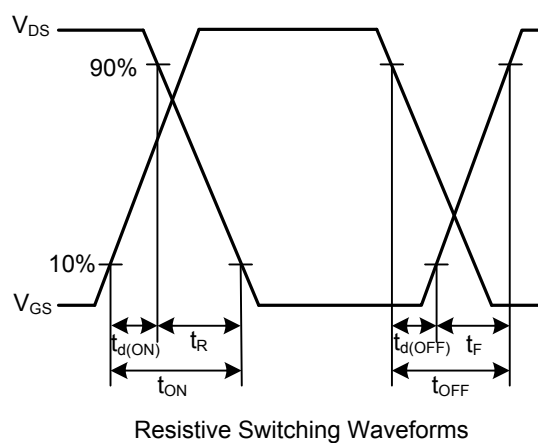
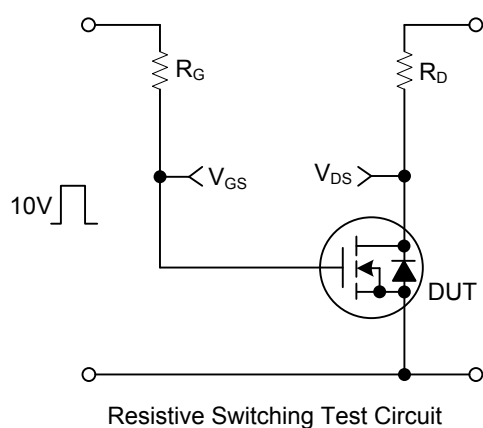
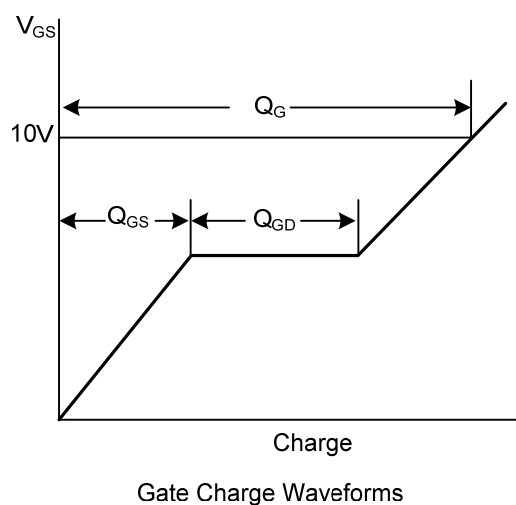
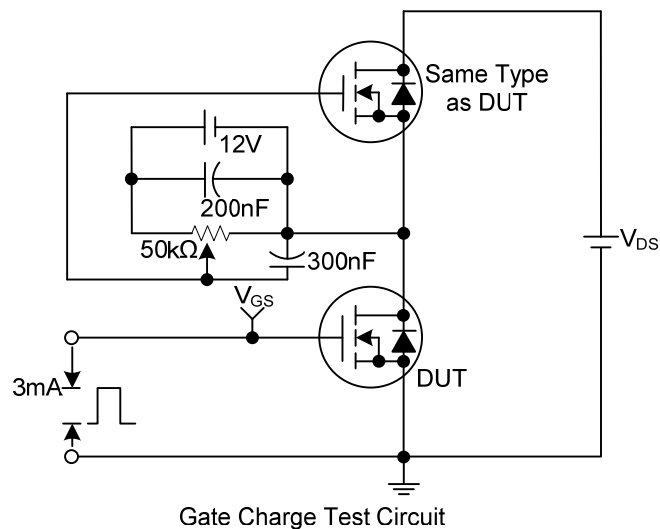
2. $I_{AS}=5.5A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$.

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

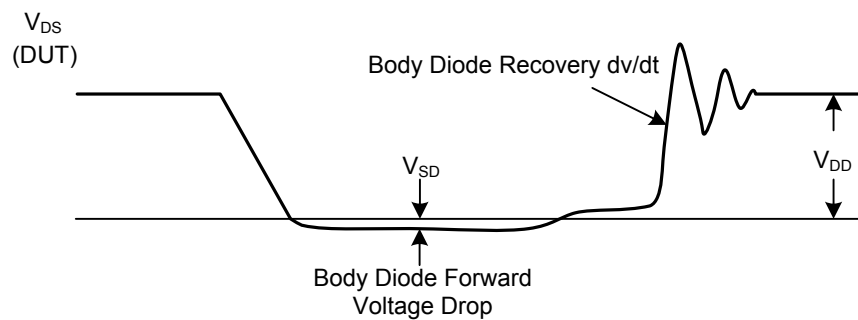
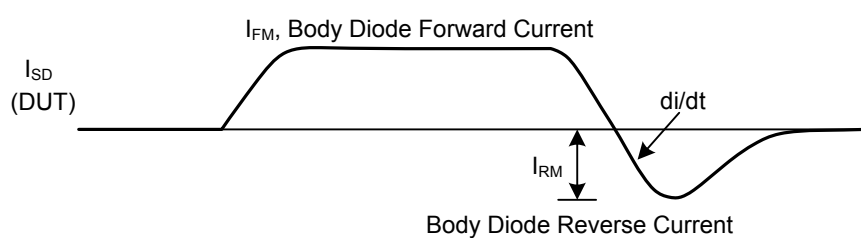
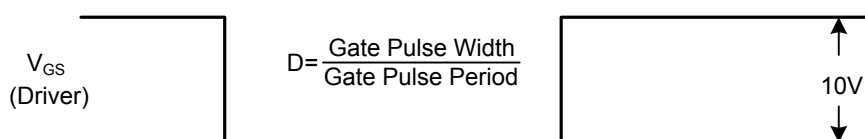
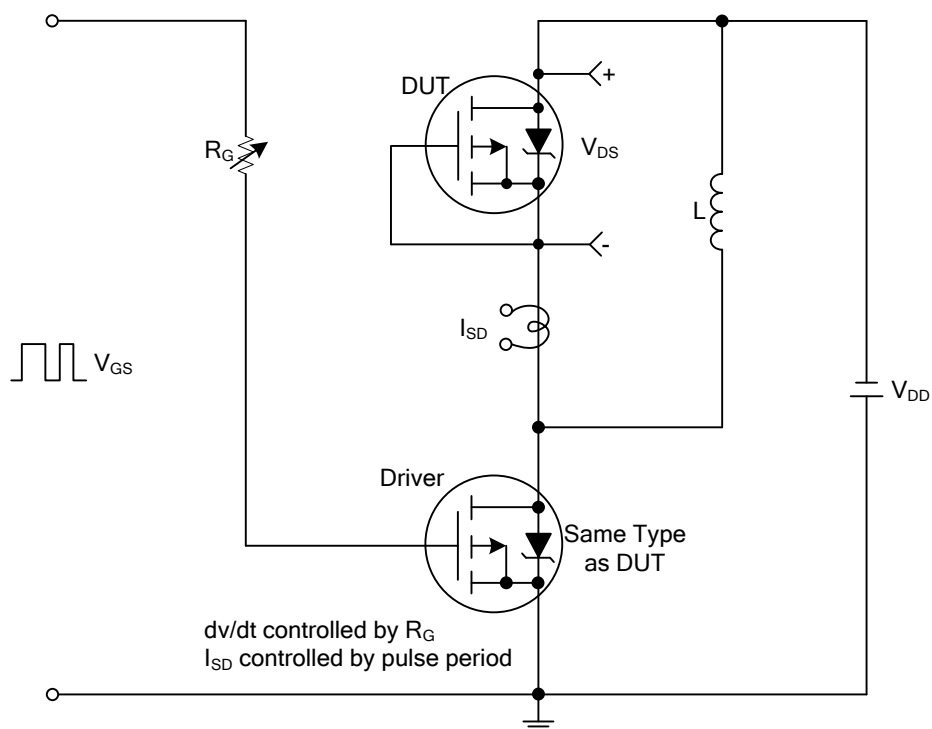
4. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

5. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



■ TEST CIRCUITS AND WAVEFORMS(Cont.)



Peak Diode Recovery dv/dt Test Circuit and Waveforms

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