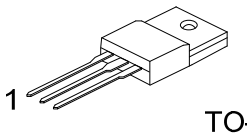
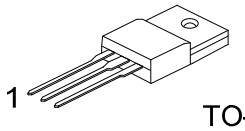
13A, 1000V N-CHANNEL SUPER-JUNCTION MOSFET



TO-220F1



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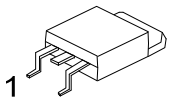


TO-263

■ DESCRIPTION

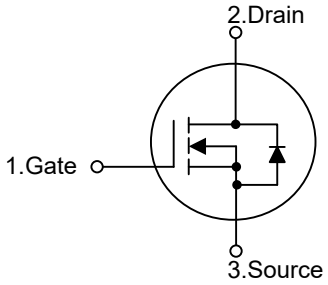
The UTC **13NM100** is an Super Junction MOSFET Structure. It uses UTC advanced planar stripe, DMOS technology to provide customers perfect switching performance, minimal on-state resistance.

The UTC **13NM100** is universally applied in electronic lamp ballasts based on half bridge topology, high efficiency switched mode power supplies, active power factor correction, etc.

■ FEATURES

* $R_{DS(ON)} \leq 0.6\ \Omega$ @ V_{GS}=10V, I_D=6.5A
* High switching speed
* High breakdown voltage

■ SYMBOL



■ ORDERING INFORMATION

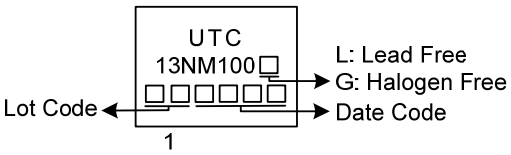
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
13NM100L-TF1-T	13NM100G-TF1-T	TO-220F1	G	D	S	Tube
13NM100L-TF2-T	13NM100G-TF2-T	TO-220F2	G	D	S	Tube
13NM100L-TQ2-T	13NM100G-TQ2-T	TO-263	G	D	S	Tube
13NM100L-TQ2-R	13NM100G-TQ2-R	TO-263	G	D	S	Tape Reel

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

13NM100G-TF1-T
(1)Packing Type
(2)Package Type
(3)Green Package

(1) T: Tube, R: Tape Reel
(2) TF1: TO-220F1, TF2: TO-220F2, TQ2: TO-263
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	1000	V
Drain-Gate Voltage		V_{DGR}	1000	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	Continuous	I_D	13	A
	Pulsed	I_{DM}	26	A
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	338	mJ
Power Dissipation	TO-220F1 TO-220F2	P_D	32	W
	TO-263		120	W
Junction Temperature		T_J	-55 ~ +150	°C
Storage Temperature Range		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=100mH, I_{AS}=2.6A, V_{DD}= 120V, R_G=25Ω, Starting T_J=25°C
4. I_{SD} ≤ 13A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient		θ_{JA}	62.5	°C/W
Junction to Case	TO-220F1 TO-220F2	θ_{JC}	3.9	°C/W
	TO-263		1.04 (Note)	°C/W

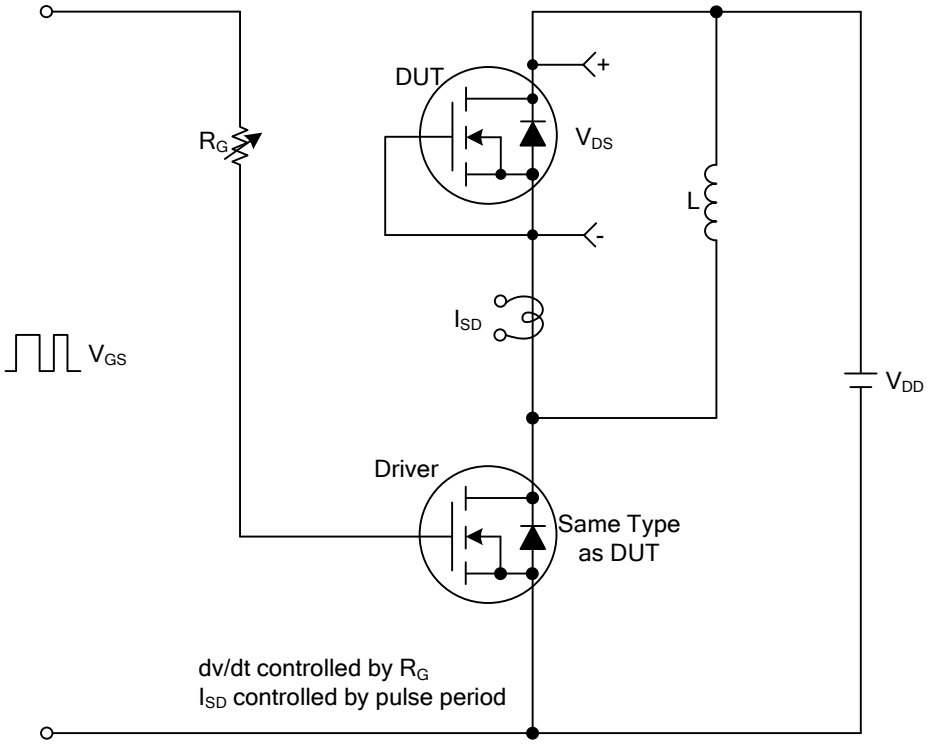
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

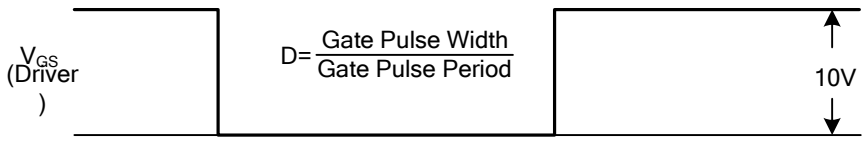
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=0.25mA, V_{GS}=0V, T_J=25°C	1000			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=1000V, V_{GS}=0V, T_J=25°C			10	μA
			V_{DS}=1000V, V_{GS}=0V, T_C=125°C			100	μA
Gate-Source Leakage 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	2.5		4.5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=6.5A			0.6	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=50V, f=1.0MHz		1300		pF
Output Capacitance		C_{OSS}			72		pF
Reverse Transfer Capacitance		C_{RSS}			3.5		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=800V, V_{GS}=10V, I_D=13A, (Note 1,2)		58		nC
Gate to Source Charge		Q_{GS}			14		nC
Gate to Drain Charge		Q_{GD}			23		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=100V, V_{GS}=10V, I_D=13A, R_G=25Ω (Note 1,2)		14		ns
Rise Time		t_R			23		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			160		ns
Fall-Time		t_F			76		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S	T_C=25°C			13	A
Maximum Body-Diode Pulsed Current		I_{SM}	T_C=25°C			26	A
Drain-Source Diode Forward Voltage		V_{SD}	I_F=13A, V_{GS}=0V			1.4	V
Reverse Recovery Time		t_{rr}	I_S=13A,V_{GS}=0V, dI_F/dt=100A/μs (Note 1)		640		ns
Reverse Recovery Charge		Q_{rr}			11.5		μC

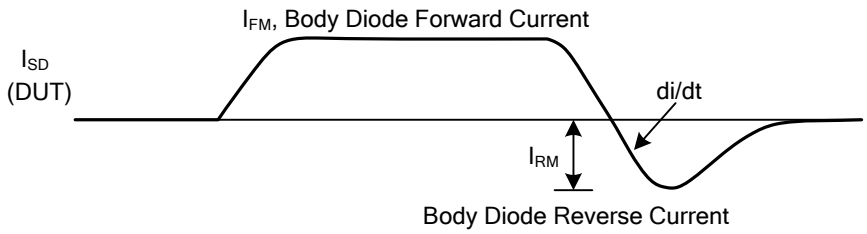
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle≤2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

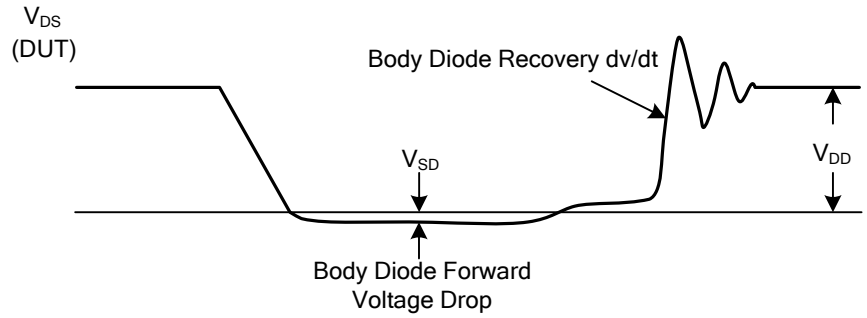


Peak Diode Recovery dv/dt Test Circuit & Waveforms

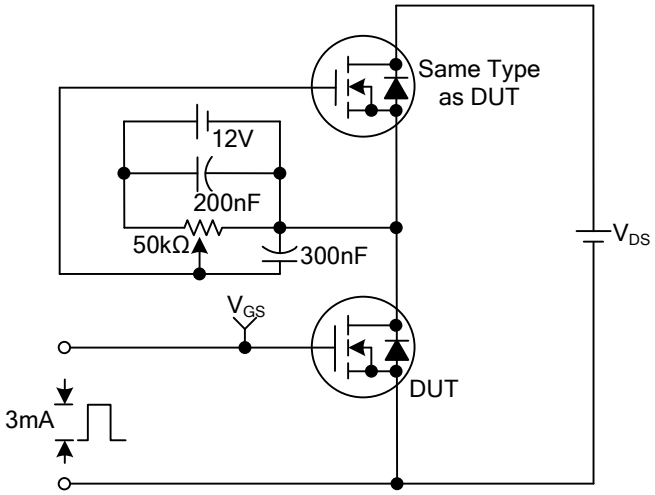




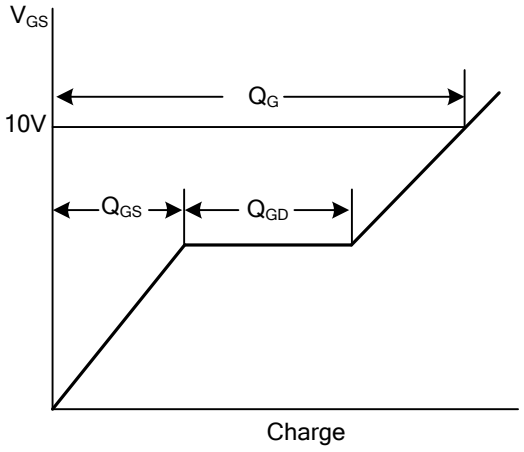
Body Diode Reverse Current



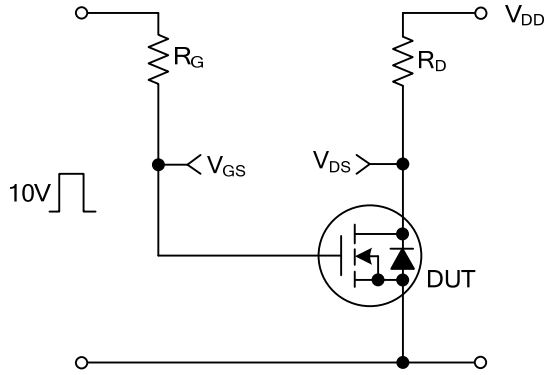
■ TEST CIRCUITS AND WAVEFORMS(Cont.)



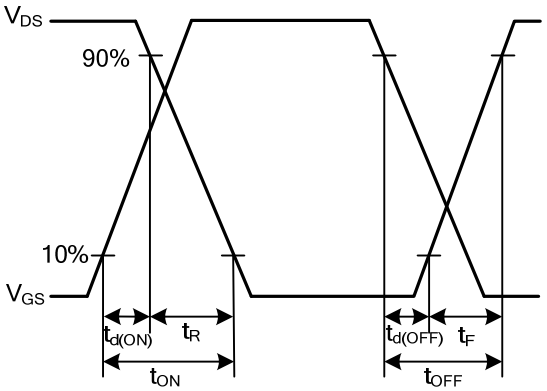
Gate Charge Test Circuit



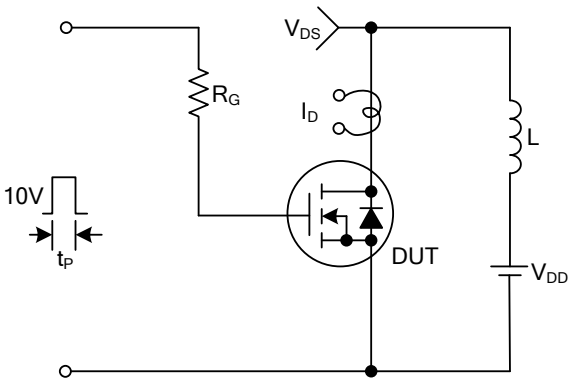
Gate Charge Waveforms



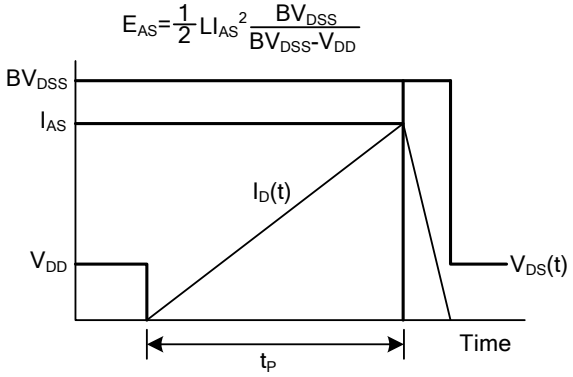
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms