

**F15NM65-U2**

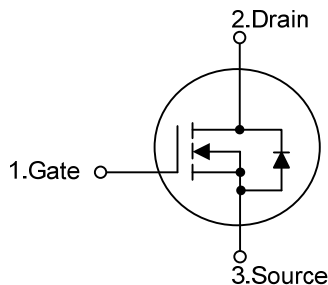
Preliminary

Power MOSFET**15A, 650V N-CHANNEL
SUPER-JUNCTION MOSFET****DESCRIPTION**

The UTC F15NM65-U2 is a N-Channel enhancement mode silicon gate power MOSFET with Fast Body Diode. is designed high voltage, high speed power switching applications such. such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics.

FEATURES

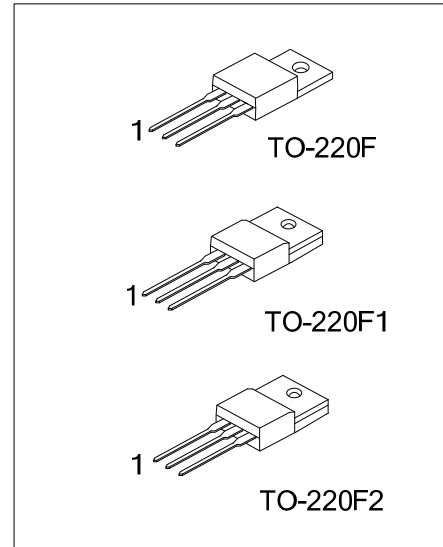
- * $R_{DS(ON)} \leq 0.4 \Omega$ @ $V_{GS}=10V$, $I_D=7.5A$
- * Fast body diode MOSFET technology
- * Low switching losses due to reduced Q_{rr}
- * Single Pulse Avalanche Energy Rated
- * Fast Switching Speeds
- * Linear Transfer Characteristics
- * High Input Impedance
- * Avalanche energy tested

SYMBOL**ORDERING INFORMATION**

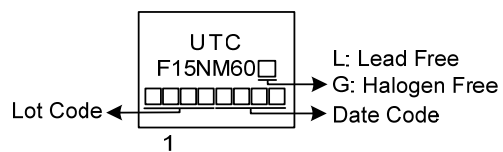
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
F15NM65L-TF1-T	F15NM65G-TF1-T	TO-220F1	G	D	S	Tube
F15NM65L-TF2-T	F15NM65G-TF2-T	TO-220F2	G	D	S	Tube
F15NM65L-TF3-T	F15NM65G-TF3-T	TO-220F	G	D	S	Tube

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

F15NM65G-TF1-T (1) Packing Type (2) Package Type (3) Green Package		(1) T: Tube (2) TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	± 30	V
Continuous Drain Current	Continuous	I_D	15	A
Pulsed Drain Current	Pulsed (Note 2)	I_{DM}	60	A
Avalanche energy	Single Pulsed (Note 3)	E_{AS}	427.7	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.7	V/nS
Power Dissipation		P_D	32	W
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. Repetitive Rating: Pulse width limited by maximum junction temperature.

3. $L=66\text{mH}$, $I_{AS}=3.6\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J = 25^{\circ}\text{C}$.

4. $I_{SD} \leq 15\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J = 25^{\circ}\text{C}$.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
Junction to Case		θ_{JC}	3.9	$^{\circ}\text{C}/\text{W}$

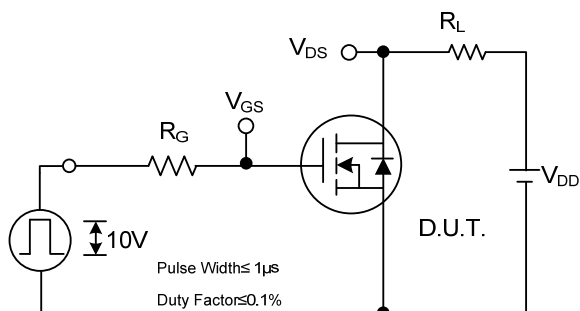
■ ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	650			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =650V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{DS} =0V, V _{GS} =+30V			+100	nA
	Reverse		V _{DS} =0V, V _{GS} =-30V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} = V _{GS} , I _D =250μA	2.5		4.5	V
Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =7.5A			0.4	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		940		pF
Output Capacitance		C _{OSS}			725		pF
Reverse Transfer Capacitance		C _{RSS}			64		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =520V, V _{GS} =10V, I _D =15A I _G =1mA (Note 1, 2)		32		nC
Gate to Source Charge		Q _{GS}			9		nC
Gate to Drain Charge		Q _{GD}			3		nC
Turn-on Delay Time (Note 1)		t _{D(ON)}	V _{DS} =100V, V _{GS} =10V, I _D =15A, R _G =25Ω (Note 1, 2)		12		ns
Rise Time		t _R			22		ns
Turn-off Delay Time		t _{D(OFF)}			116		ns
Fall-Time		t _F			47		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Pulsed Current		I _S				15	A
Drain-Source Diode Forward Voltage (Note 1)		I _{SM}				60	A
Maximum Body-Diode Continuous Current		V _{SD}	I _S =15A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =15A, V _{GS} =0V,		244		ns
Reverse Recovery Charge		Q _{rr}	dI _F /dt=100A/μs		5		μC

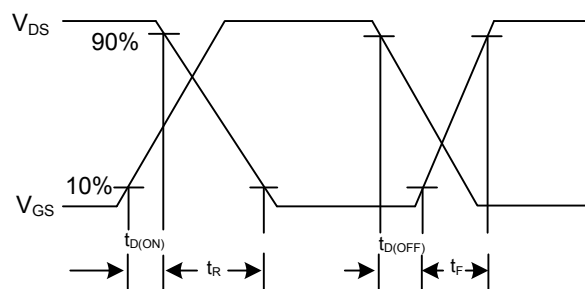
Note: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

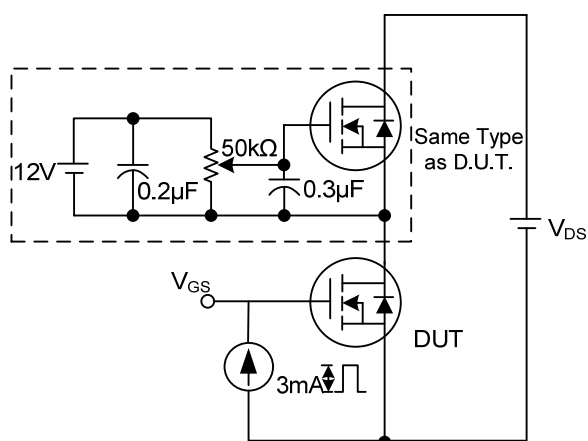
■ TEST CIRCUITS AND WAVEFORMS



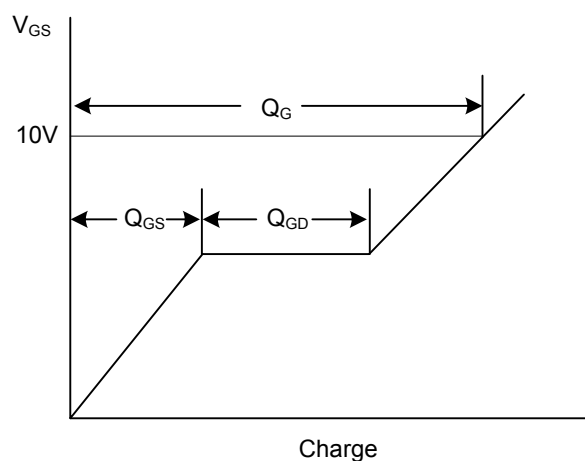
Switching Test Circuit



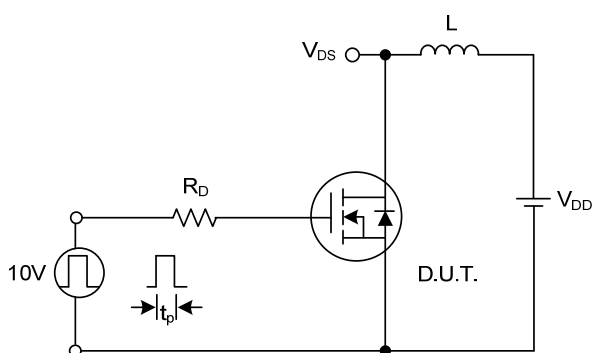
Switching Waveforms



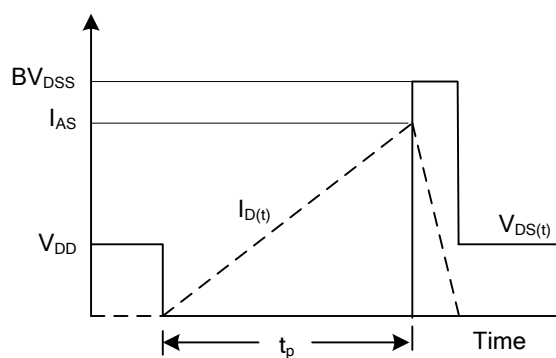
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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