



12N65K-MT

Power MOSFET

12A, 650V N-CHANNEL POWER MOSFET

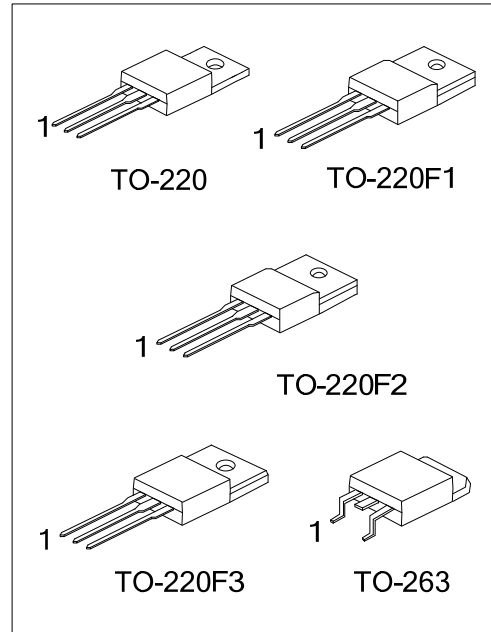
DESCRIPTION

The UTC **12N65K-MT** are N-Channel enhancement mode power field effect transistors (MOSFET) which are produced by using UTC's proprietary, planar stripe and DMOS technology.

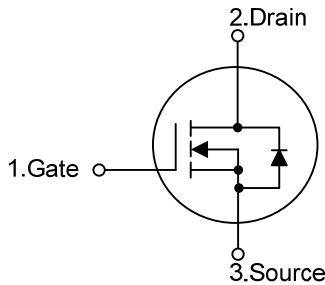
These devices are suited for high efficiency switch mode power supply. To minimize on-state resistance, provide superior switching performance and withstand high energy pulse in the avalanche and commutation mode, the advanced technology has been especially tailored.

FEATURES

- * $R_{DS(ON)} < 0.75 \Omega @ V_{GS} = 10 V, I_D = 6 A$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness



SYMBOL



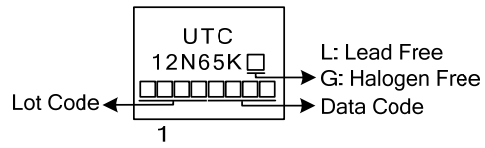
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
12N65KL-TA3-T	12N65KG-TA3-T	TO-220	G	D	S	Tube
12N65KL-TF1-T	12N65KG-TF1-T	TO-220F1	G	D	S	Tube
12N65KL-TF2-T	12N65KG-TF2-T	TO-220F2	G	D	S	Tube
12N65KL-TF3-T	12N65KG-TF3-T	TO-220F3	G	D	S	Tube
12N65KL-TQ2-T	12N65KG-TQ2-T	TO-263	G	D	S	Tube
12N65KL-TQ2-R	12N65KG-TQ2-R	TO-263	G	D	S	Tape Reel

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

<p>12N65KG-TF1-T</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 TF3: TO-220F3, TQ2: TO-263 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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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
Drain Current	Continuous	I_D	12	A
	Pulsed (Note 2)	I_{DM}	48	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	400	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.7	V/ns
Power Dissipation	TO-220/TO-263	P_D	225	W
	TO-220F1/TO-220F2		51	W
	TO-220F3			
Junction Temperature		T_J	+150	$^\circ\text{C}$
Operating Temperature		T_{OPR}	-55 ~ +150	$^\circ\text{C}$
Storage Temperature		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. $L = 5.55\text{mH}$, $I_{AS} = 12\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 12\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$ Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient		θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220/TO-263	θ_{JC}	0.56	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2		2.43	$^\circ\text{C}/\text{W}$
	TO-220F3			

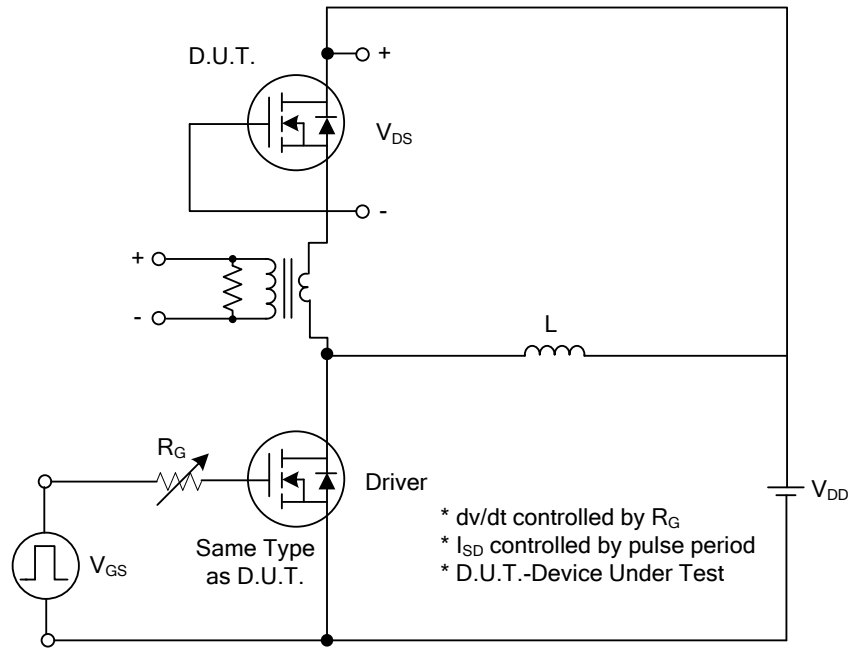
■ ELECTRICAL CHARACTERISTICS (T_C = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0 V, I _D = 250 μA	650			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} = 650 V, V _{GS} = 0 V			1	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} = ±30 V, V _{DS} = 0 V			±100	nA
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D = 250 μA, Referenced to 25°C		0.7		V/°C
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} = V _{GS} , I _D = 250 μA	2.0		4.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 6.0A		0.60	0.75	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1MHz		1600	1900	pF
Output Capacitance	C _{OSS}			175	210	pF
Reverse Transfer Capacitance	C _{RSS}			10	22	pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DS} = 50V, I _D = 1.3A, V _{GS} = 10 V (Note 1, 2)		39	54	nC
Gate-Source Charge	Q _{GS}			10		nC
Gate-Drain Charge	Q _{GD}			9		nC
Turn-On Delay Time	t _{D(ON)}	V _{DD} = 30V, I _D = 0.5A, R _G = 25Ω (Note 1, 2)		100	110	ns
Turn-On Rise Time	t _R			125	138	ns
Turn-Off Delay Time	t _{D(OFF)}			180	230	ns
Turn-Off Fall Time	t _F			104	140	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				12	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				48	A
Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} = 0 V, I _S = 12A			1.4	V
Reverse Recovery Time	t _{rr}	I _S = 12A, V _{GS} = 0V di/dt = 100A/μs (Note 1)		590		ns
Reverse Recovery Charge	Q _{rr}			6.2		μC

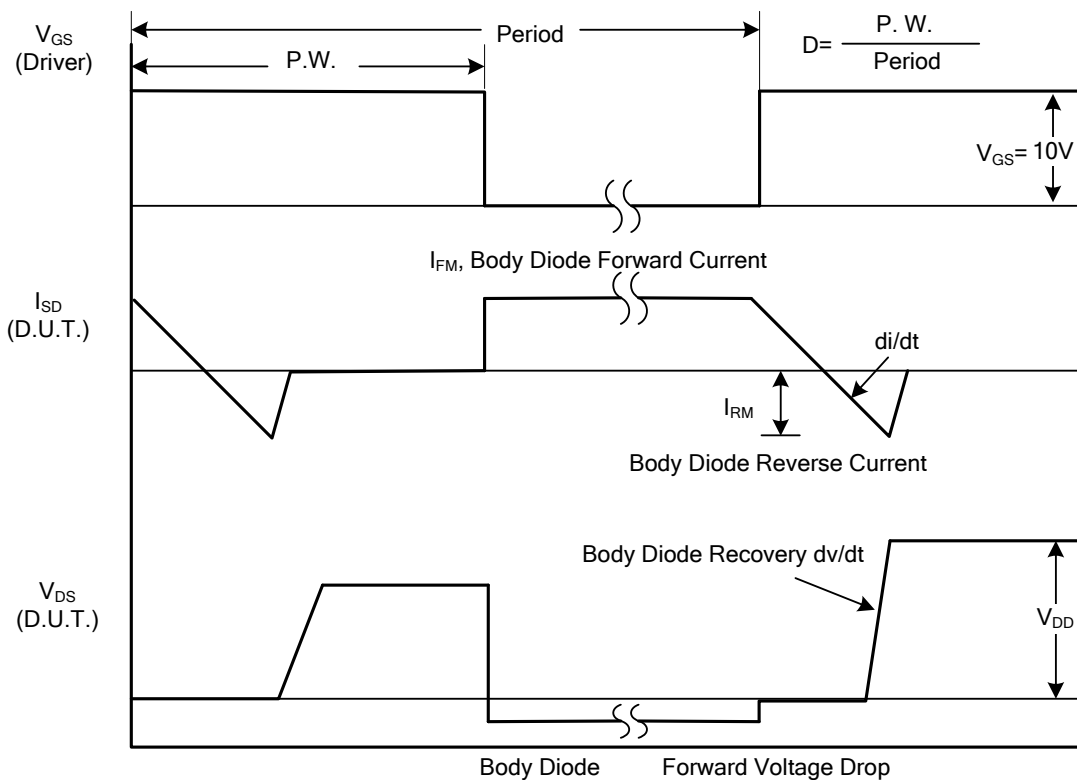
Notes: 1. Pulse Test : Pulse width ≤ 300 μs, Duty cycle ≤ 2%

2. Essentially independent of operating temperature

TEST CIRCUITS AND WAVEFORMS

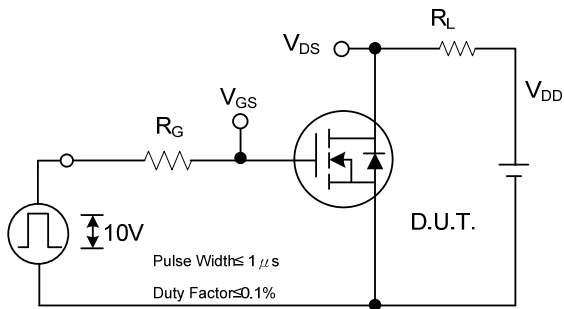


Peak Diode Recovery dv/dt Test Circuit

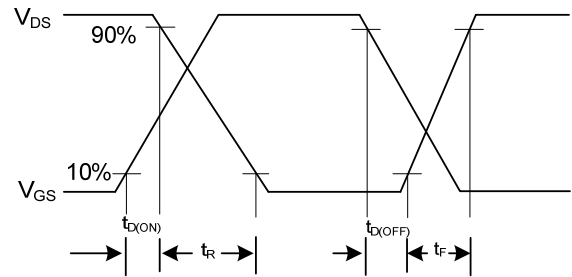


Peak Diode Recovery dv/dt Waveforms

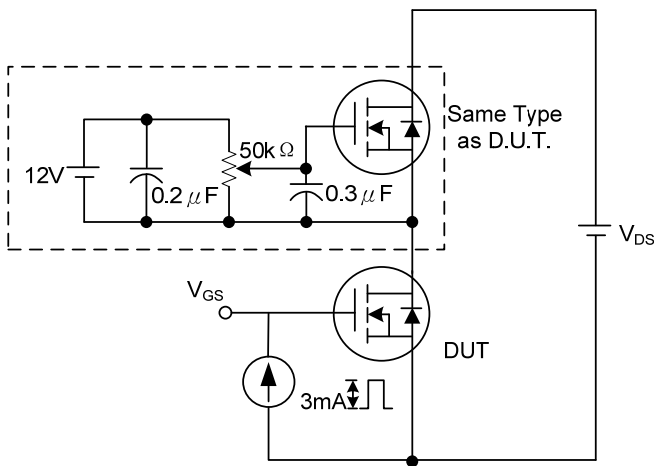
TEST CIRCUITS AND WAVEFORMS (Cont.)



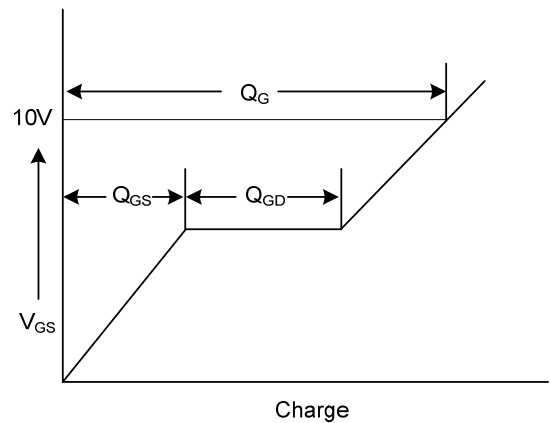
Switching Test Circuit



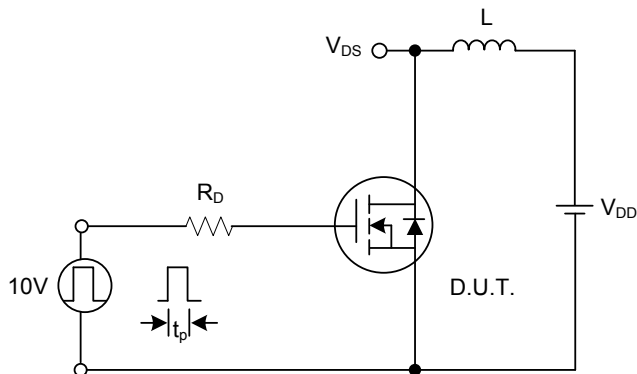
Switching Waveforms



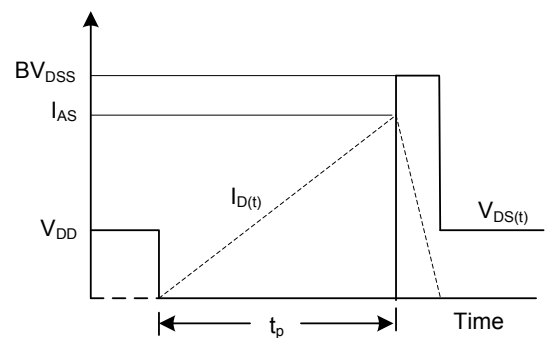
Gate Charge Test Circuit



Gate Charge Waveform

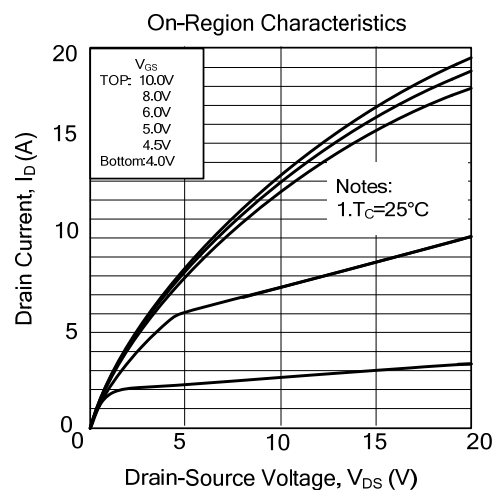
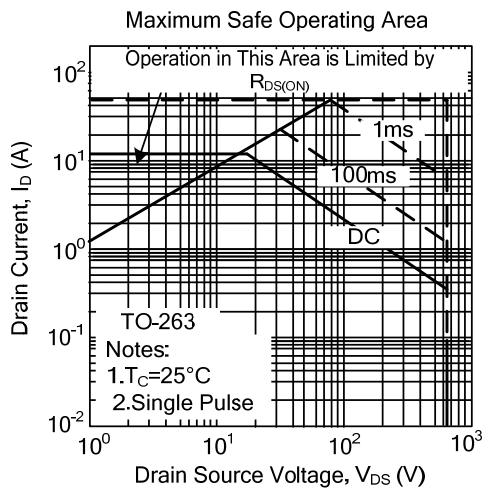
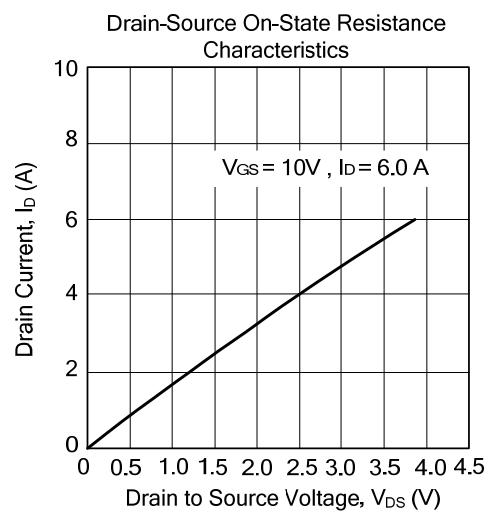
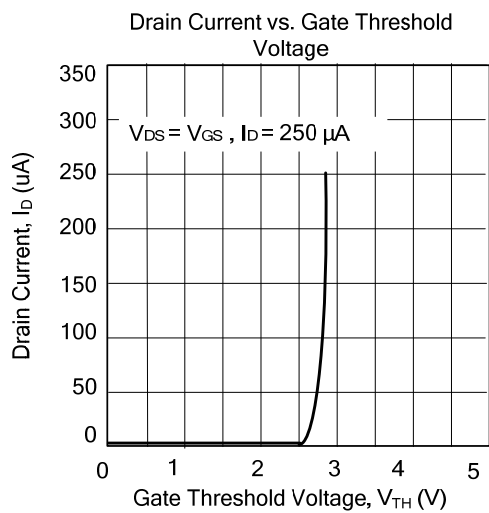
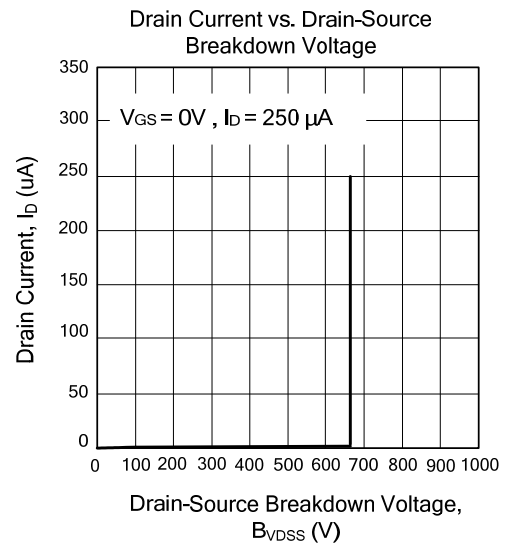
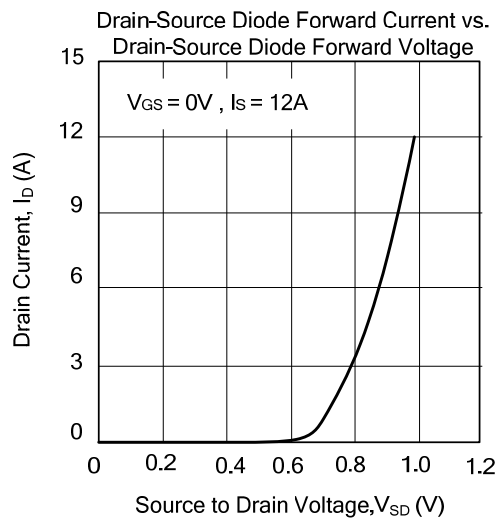


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS



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