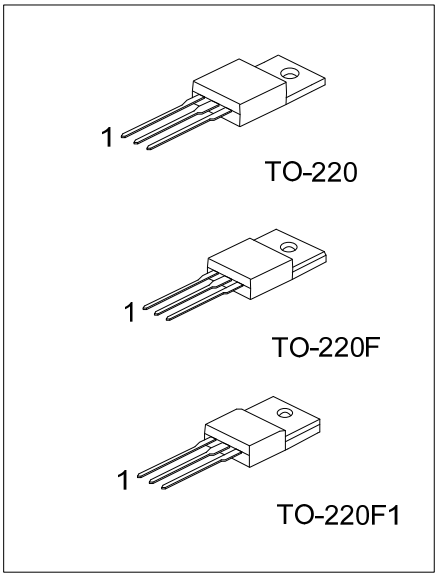
12N65-CBQ

Power MOSFET

12A, 650V N-CHANNEL POWER MOSFET



■ DESCRIPTION

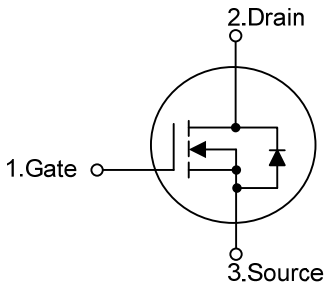
The UTC **12N65-CBQ** is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

■ FEATURES

* $R_{DS(ON)}$ < 1.0 Ω @ V_{GS} = 10 V, I_D = 6.0 A
* Fast switching capability
* Avalanche energy specified

■ SYMBOL



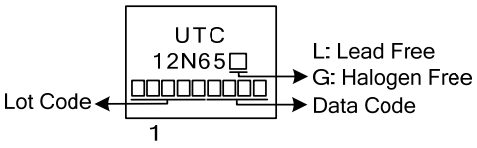
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
12N65L-TA3-T	12N65G-TA3-T	TO-220	G	D	S	Tube
12N65L-TF1-T	12N65G-TF1-T	TO-220F1	G	D	S	Tube
12N65L-TF3-T	12N65G-TF3-T	TO-220F	G	D	S	Tube

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

12N65L-TA3-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube (2) TA3: TO-220, TF1: TO220F1, TF3: TO-220F (3) L: Lead Free, G: Halogen Free and Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°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 Current (Note 2)		I_{AR}	6.3	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	198	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.2	V/ns
Power Dissipation	TO-220	P_D	225	W
	TO-220F/TO-220F1		51	W
Junction Temperature		T_J	+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 = 10mH, I_{AS} = 6.3A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 12A, di/dt ≤200A/μs, V_{DD} ≤BV_{DSS} Starting T_J = 25°C

■ THERMAL DATA

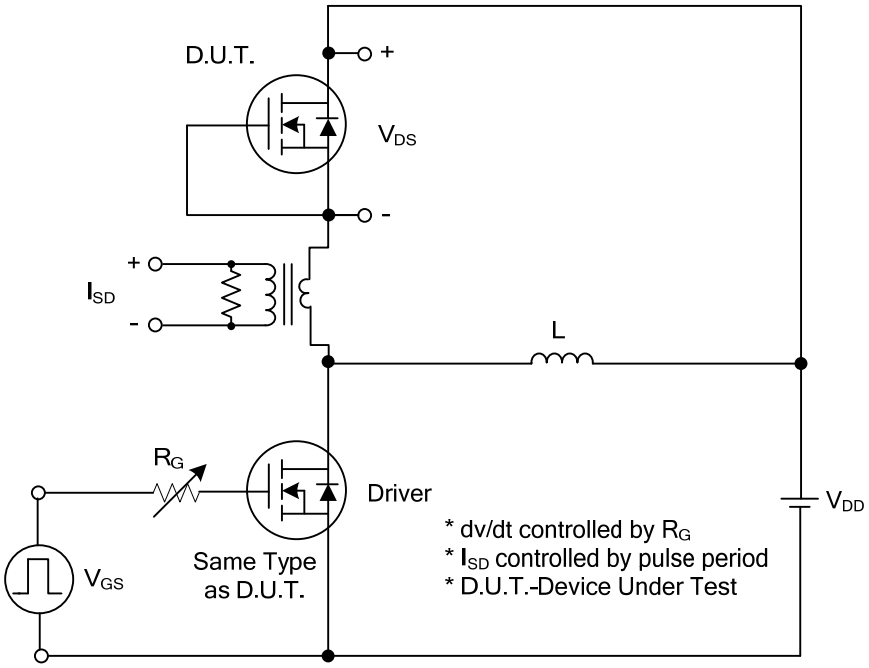
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient		$θ_{JA}$	62.5	°C/W
Junction to Case	TO-220	$θ_{JC}$	0.56	°C/W
	TO-220F/TO-220F1		2.45	°C/W

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

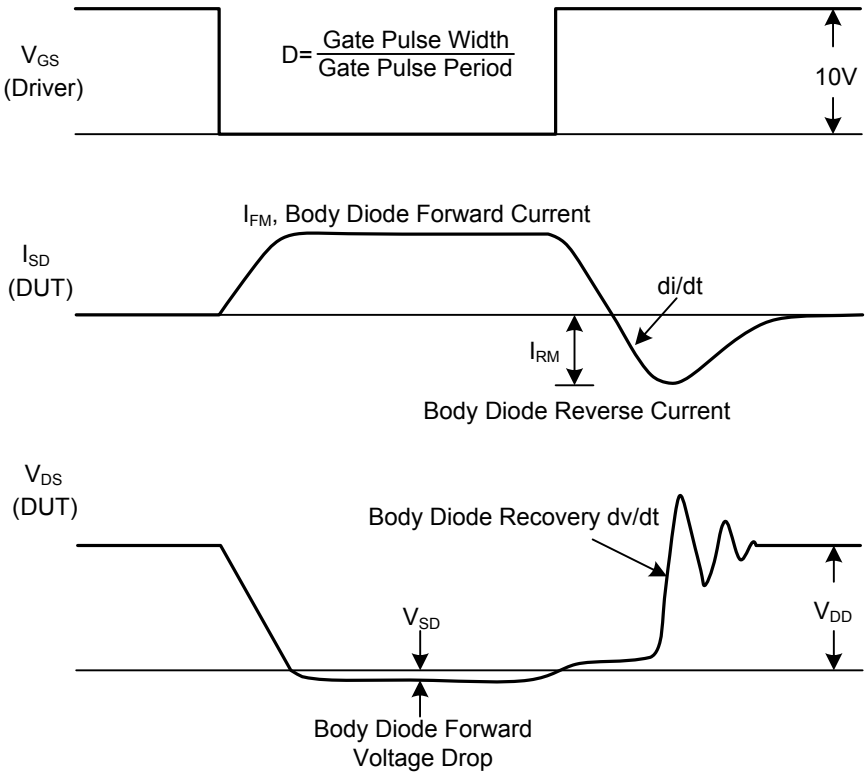
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = 250 μA	650			V
Drain-Source Leakage Current	I_{DSS}	V_{DS} = 650 V, V_{GS} = 0 V			1	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = ±30 V, V_{DS} = 0 V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS} = V_{GS}, I_D = 250μA	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 6.0A			1.0	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1MHz		1369		pF
Output Capacitance	C_{OSS}			128		pF
Reverse Transfer Capacitance	C_{RSS}			6.0		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q_G	V_{DS}=50V, V_{GS}=10V, I_D=1.3A, I_D=100μA (Note 1, 2)		75		nC
Gate-Source Charge	Q_{GS}			7.6		nC
Gate-Drain Charge	Q_{GD}			9.0		nC
Turn-On Delay Time	$t_{D(ON)}$	V_{DS}=30V, V_{GS}=10V, I_D=0.5A, R_G=25Ω (Note 1, 2)		64		ns
Turn-On Rise Time	t_R			36		ns
Turn-Off Delay Time	$t_{D(OFF)}$			274		ns
Turn-Off Fall Time	t_F			47		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)		440		ns
Reverse Recovery Charge	Q_{rr}			3.34		μC

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

■ TEST CIRCUITS AND WAVEFORMS

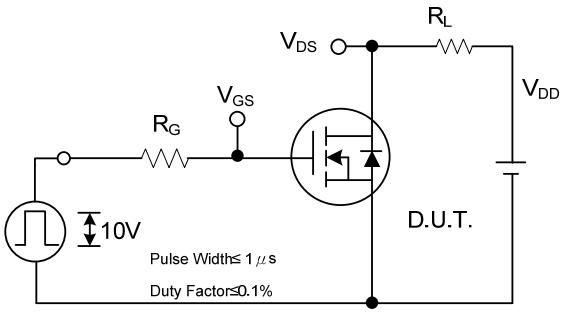


Peak Diode Recovery dv/dt Test Circuit

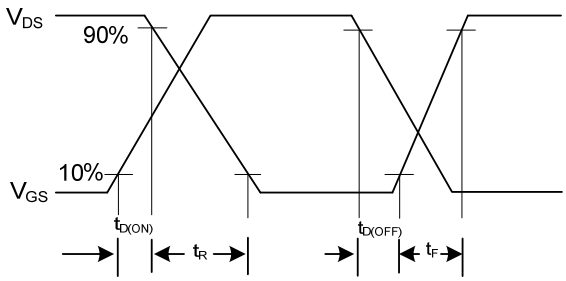


Peak Diode Recovery dv/dt Waveforms

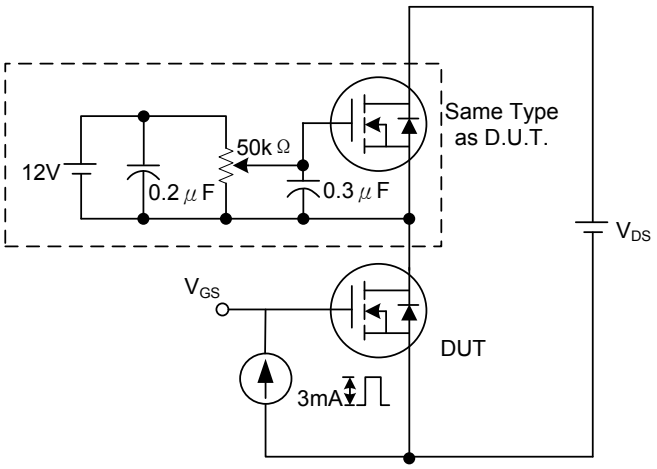
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



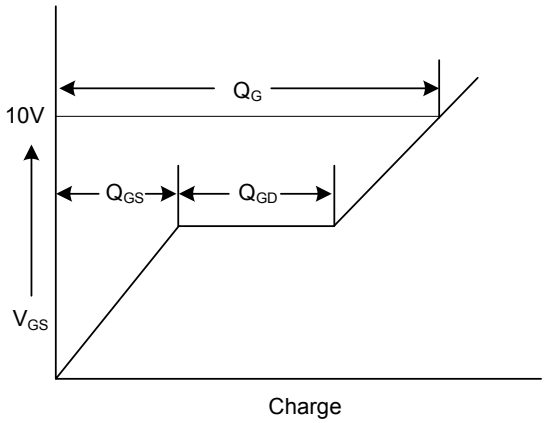
Switching Test Circuit



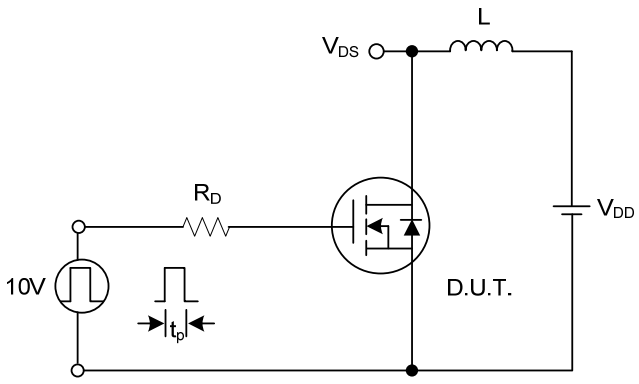
Switching Waveforms



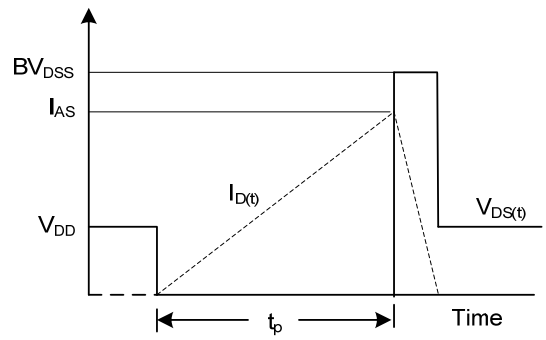
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms