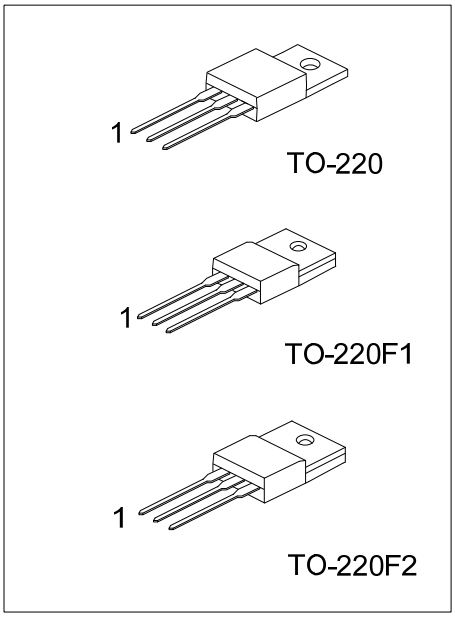
40N15-HC

Power MOSFET

40A, 150V N-CHANNEL POWER MOSFET



■ DESCRIPTION

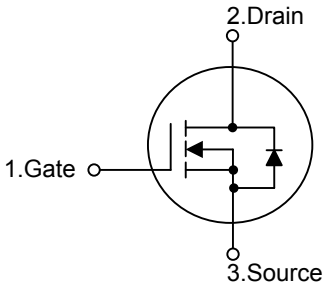
The UTC **40N15-HC** is a N-channel enhancement MOSFET using UTC's advanced technology to provide the customers with perfect $R_{DS(ON)}$, high switching speed, high current capacity and low gate charge.

The UTC **40N15-HC** is universally applied in low voltage such as automotive, high efficiency switching for AC/DC converters and DC motor control, etc.

■ FEATURES

* $R_{DS(ON)} \leq 45\ m\Omega$ @ V_{GS}=10V, I_D=20A
* High Switching Speed

■ SYMBOL



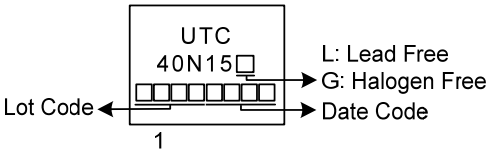
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
40N15L-TA3-T	40N15G-TA3-T	TO-220	G	D	S	Tube
40N15L-TF1-T	40N15G-TF1-T	TO-220F1	G	D	S	Tube
40N15L-TF2-T	40N15G-TF2-T	TO-220F2	G	D	S	Tube

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

40N15G-TA3-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 (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}	150	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current	Continuous	I_D	40	A
	Pulsed	I_{DM}	80	A
Single Pulsed Avalanche Energy		E_{AS}	370	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.7	V/ns
Power Dissipation	TO-220	P_D	232	W
	TO-220F1/TO-220F2		45	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=0.1mH, I_{AS}=86A, V_{DD}=50V, R_G=25Ω, Starting T_J = 25°C
4. I_{SD}≤30A, di/dt≤200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

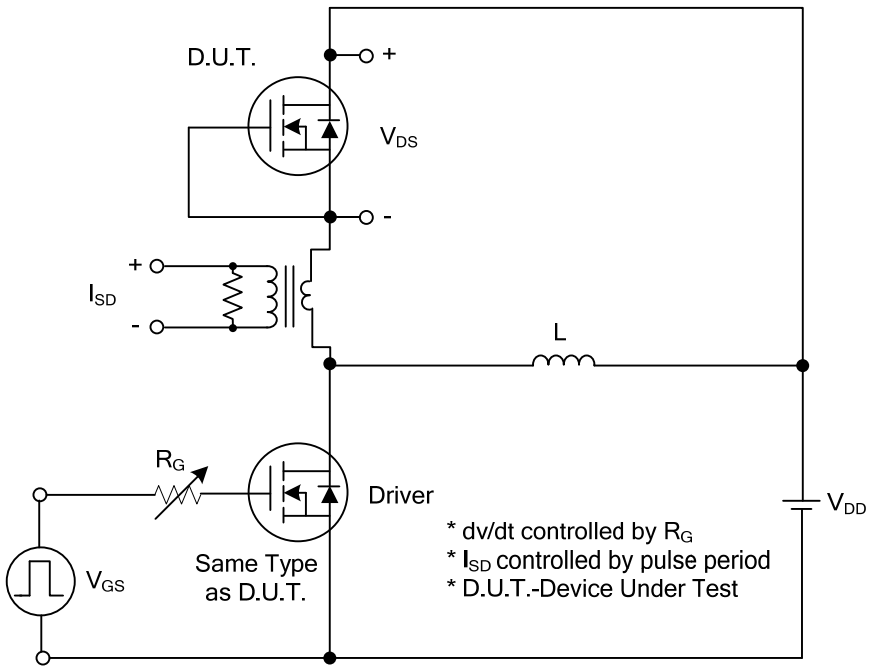
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F1 TO-220F2	$θ_{JA}$	62.5	°C/W
Junction to Case	TO-220	$θ_{JC}$	0.538	°C/W
	TO-220F1/TO-220F2		3.125	

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

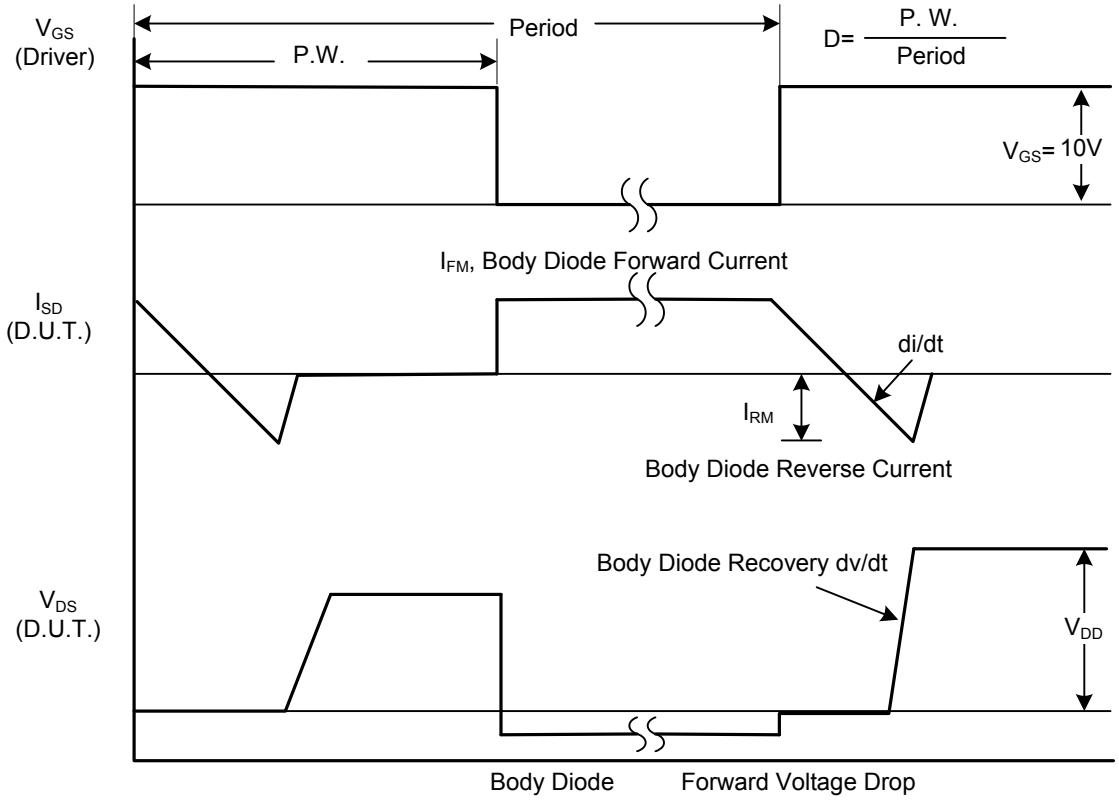
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	150			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=150V, V_{GS}=0V			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-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=20A			45	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		2820		pF
Output Capacitance		C_{OSS}			500		pF
Reverse Transfer Capacitance		C_{RSS}			33		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=120V, V_{GS}=10V, I_D=40A I_G=1mA (Note 1, 2)		66		nC
Gate to Source Charge		Q_{GS}			23		nC
Gate to Drain Charge		Q_{GD}			20		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=100V, V_{GS}=10V, I_D=40A, R_G=25Ω (Note 1, 2)		39		ns
Rise Time		t_R			27		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			162		ns
Fall-Time		t_F			35		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				40	A
Maximum Body-Diode Pulsed Current		I_{SM}				80	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=40A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time		t_{rr}	I_S=30A, V_{GS}=0V, dI_F/dt=100A/μs (Note 1)		140		ns
Reverse Recovery Charge		Q_{rr}			1.4		μC

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

■ TEST CIRCUITS AND WAVEFORMS

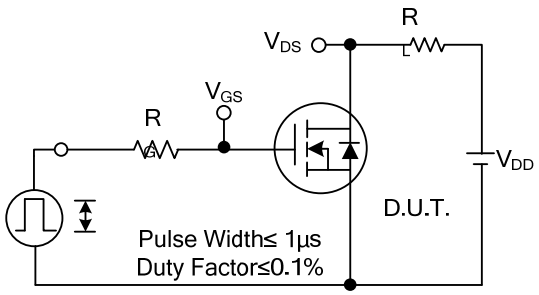


Peak Diode Recovery dv/dt Test Circuit

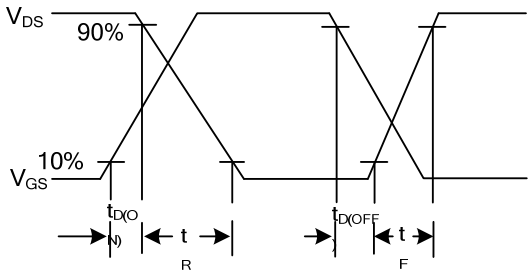


Peak Diode Recovery dv/dt Waveforms

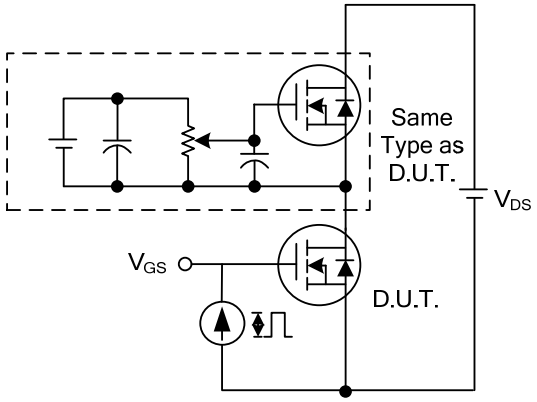
■ TEST CIRCUITS AND WAVEFORMS



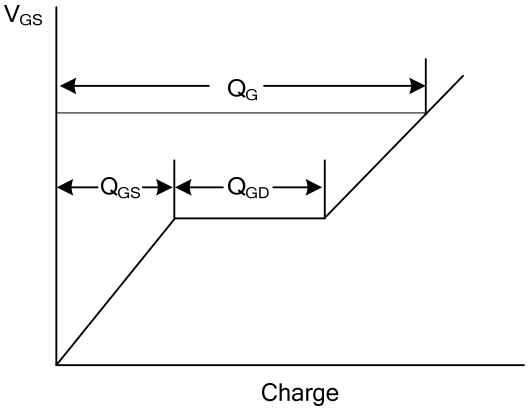
Switching Test Circuit



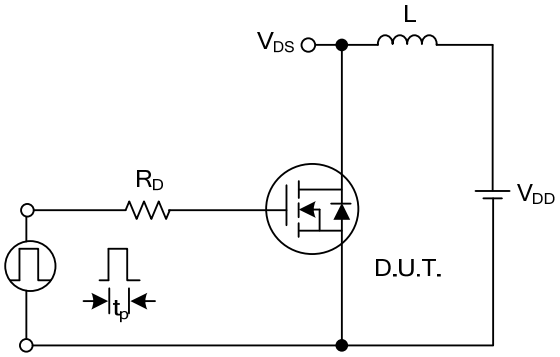
Switching Waveforms



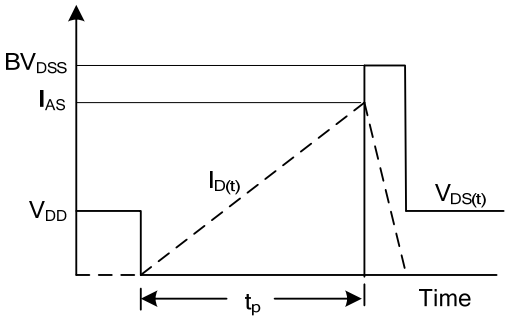
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms