



20N15-HC

Power MOSFET

20A, 150V N-CHANNEL POWER MOSFET

DESCRIPTION

The UTC **20N15-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.

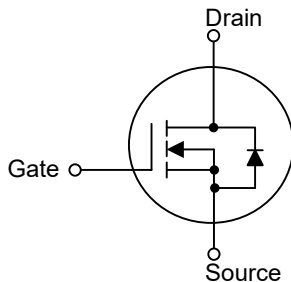
The UTC **20N15-HC** is universally applied in low voltage such as automotive, high efficiency switching for AC/DC converters and DC motor control, etc.

FEATURES

* $R_{DS(ON)} \leq 0.105 \Omega$ @ $V_{GS}=10V$, $I_D=10A$

* High Switching Speed

SYMBOL

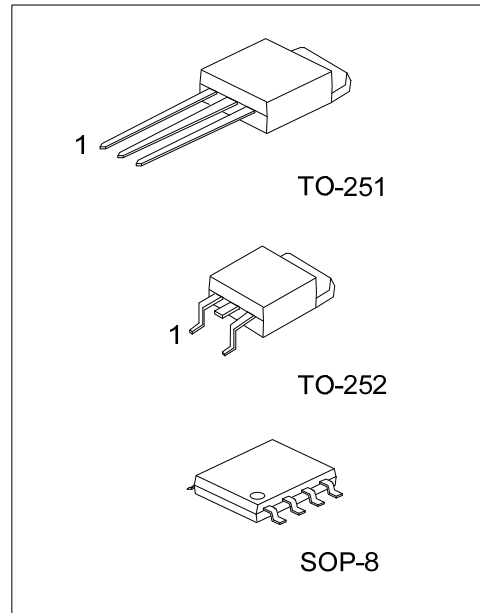


ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
20N15L-TM3-T	20N15G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
20N15L-TN3-R	20N15G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
20N15L-S08-R	20N15G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

20N15G-TM3-T	(1)Packing Type	(1) R: Tape Reel
	(2)Package Type	(2) TM3: TO-251, TN3: TO-252, S08: SOP-8
	(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free



MARKING

TO-251 / TO-252	SOP-8
Diagram of TO-251 / TO-252 marking: A rectangular package with 'UTC' and '20N15' printed on top. Below the text is a row of seven small squares. An arrow labeled 'Lot Code' points to the first square. An arrow labeled 'Date Code' points to the last square. To the right of the package, 'L: Lead Free' and 'G: Halogen Free' are listed with arrows pointing to the 'L' and 'G' respectively.	Diagram of SOP-8 marking: An 8-pin package with pins numbered 1-4 on the bottom and 5-8 on the top. 'UTC' and '20N15' are printed on the top. Below the text is a row of four small squares. An arrow labeled 'Date Code' points to the first square. An arrow labeled 'Lot Code' points to the last square. To the right of the package, 'L: Lead Free' and 'G: Halogen Free' are listed with arrows pointing to the 'L' and 'G' respectively.

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	150	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	Continuous	I_D	20	A
	Pulsed	I_{DM}	40	A
Single Pulsed Avalanche Current		I_{AS}	6	A
Single Pulsed Avalanche Energy		E_{AS}	541.8	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.7	V/ns
Power Dissipation	TO-251	P_D	46	W
	TO-252			
	SOP-8		5.5	W
Junction Temperature		T_J	+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. $L=30\text{mH}$, $I_{AS}=6.0\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD}\leq 20\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient (Note)	TO-251	θ_{JA}	50	$^{\circ}\text{C}/\text{W}$
	TO-252			
	SOP-8		90	$^{\circ}\text{C}/\text{W}$
Junction to Case (Note)	TO-251	θ_{JC}	2.7	$^{\circ}\text{C}/\text{W}$
	TO-252			
	SOP-8		22.7	$^{\circ}\text{C}/\text{W}$

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

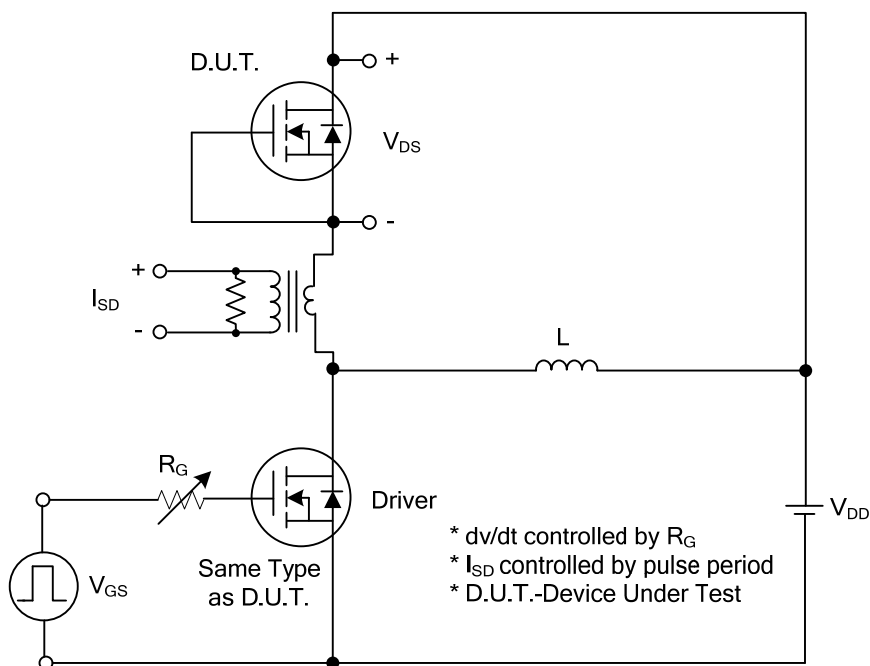
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =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 =10A			0.105	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		864.7		pF
Output Capacitance		C _{OSS}			185.6		pF
Reverse Transfer Capacitance		C _{RSS}			13.4		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =120V, V _{GS} =10V, I _D =20A I _G =1mA (Note 1, 2)		21.6		nC
Gate to Source Charge		Q _{GS}			8.2		nC
Gate to Drain Charge		Q _{GD}			4.1		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =20A, R _G =25Ω (Note 1, 2)		7.8		ns
Rise Time		t _R			17.4		ns
Turn-OFF Delay Time		t _{D(OFF)}			18		ns
Fall-Time		t _F			17.5		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				20	A
Maximum Body-Diode Pulsed Current		I _{SM}				40	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =20A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time		t _{rr}	I _S =20A, V _{GS} =0V, dI _F /dt=100A/μs		95		ns
Reverse Recovery Charge		Q _{rr}	(Note 1)		0.6		μC

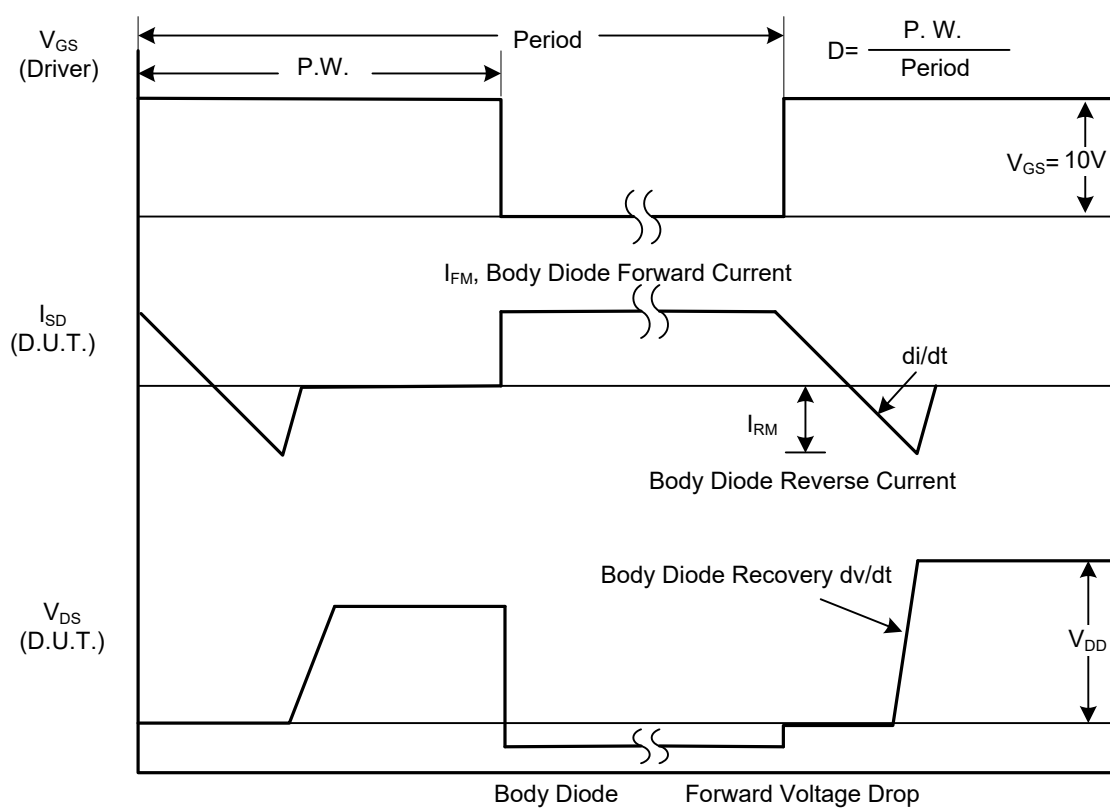
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

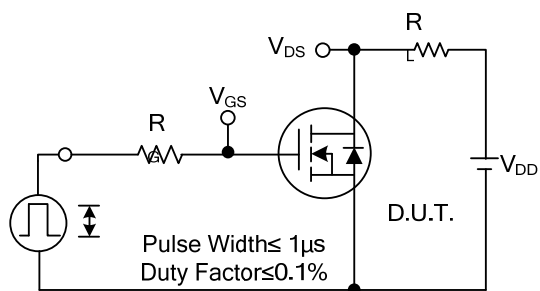


Peak Diode Recovery dv/dt Test Circuit

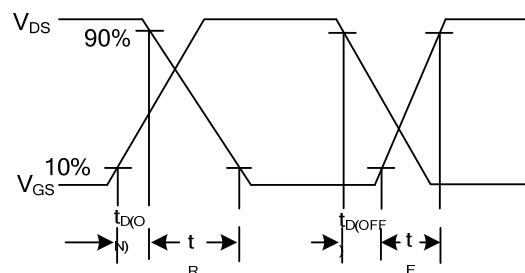


Peak Diode Recovery dv/dt Waveforms

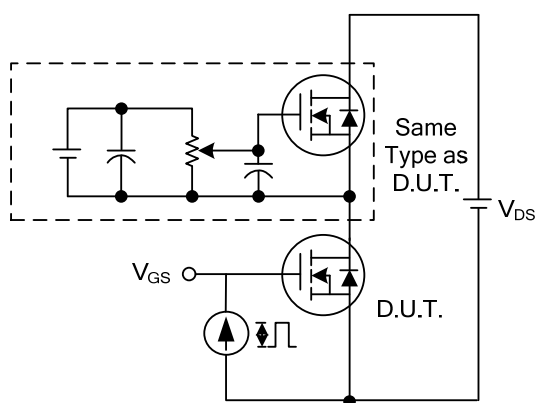
■ TEST CIRCUITS AND WAVEFORMS



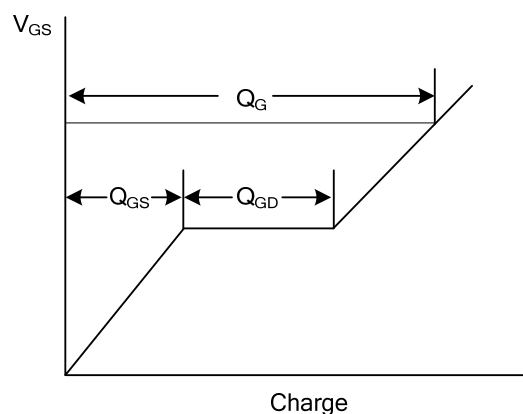
Switching Test Circuit



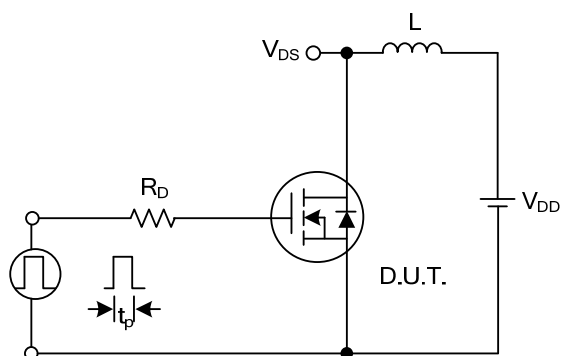
Switching Waveforms



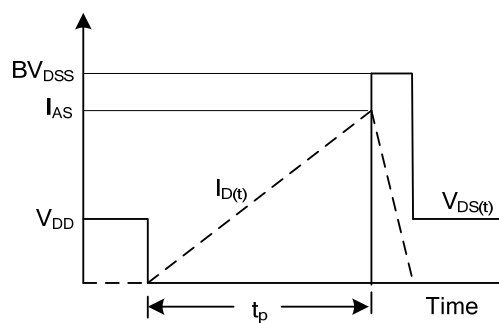
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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