

# D20N10E

## 20 Amps, 95Volts N-CHANNEL Power MOSFET

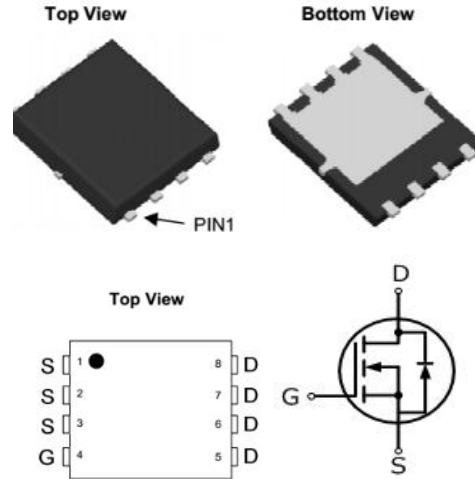
### FEATURE

- 20A,95V, $R_{DS(ON)MAX}=7m\Omega$   $V_{GS}=10V/5A$
- Low gate charge
- Low  $C_{iss}$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

### APPLICATION

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- LCD/LED back light

### DFN5\*6



### GENERAL DESCRIPTION

The D20N10E is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent R<sub>DS(on)</sub> and gate charge for most of the synchronous buck converter applications.

The D20N10E meet the RoHS and Green product requirement,100% EAS guaranteed with full function reliability approved.

### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ , unless otherwise noted)

Parameter	Symbol	D20N10E	UNIT
Drain-Source Voltage	$V_{DSS}$	95	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	
Continuous Drain Current	$I_D$	20	A
Pulsed Drain Current(Note 1)	$I_{DM}$	80	
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	20	mJ
Avalanche Current	$I_{AS}$	20	A
Reverse Diode dv/dt (Note 3)	dv/dt	5.5	V/ns
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$
Channel Temperature	$T_{CH}$	150	$^\circ\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	$T_L$	260	$^\circ\text{C}$

### Thermal Characteristics

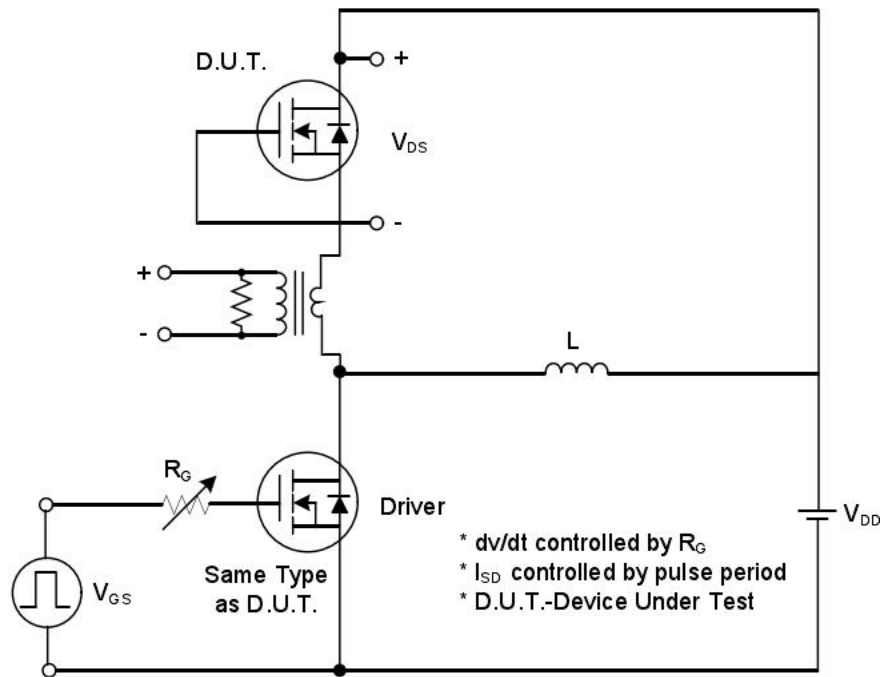
Parameter	Symbol	MAX	Units
Thermal resistance , Channel to Case	$R_{th(ch-c)}$	2.7	$^\circ\text{C}/\text{W}$
Thermal resistance , Channel to Ambient	$R_{th(ch-a)}$	55	$^\circ\text{C}/\text{W}$
Maximum Power Dissipation	$T_C=25^\circ\text{C}$ $P_D$	38	W

<b>Electrical Characteristics</b> ( $T_c=25^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	95	—	—	V
Breakdown Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=250\mu A$	—	0.06	—	$V/^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=90V, V_{GS}=0V$	—	—	1	$\mu A$
	$I_{DSS}$	$V_{DS}=90V, V_{GS}=0V$ ( $T_J = 55^\circ\text{C}$ )	—	—	5	$\mu A$
Gate-Body Leakage Current, Forward	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	—	—	$\pm 100$	nA
<b>On Characteristics</b>						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS}=10V, I_D=250\mu A$	2.0	—	4.0	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=5A$	—	5.2	7	m $\Omega$
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=50V, V_{GS}=0V,$ $f=1.0\text{MHZ}$	—	2020	—	pF
Output Capacitance	$C_{oss}$		—	450	—	pF
Reverse Transfer Capacitance	$C_{rss}$		—	260	—	pF
<b>Switching Characteristics</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=50V, I_D=1A,$ $R_G=6.8\Omega, V_{GS}=10V$ $R_L=25\Omega$ , (Note4,5)	—	25	—	ns
Turn-On Rise Time	$t_r$		—	18.5	—	ns
Turn-Off Delay Time	$t_{d(off)}$		—	58	—	ns
Turn-Off Fall Time	$t_f$		—	75	—	ns
Total Gate Charge	$Q_g$	$V_{DS}=50V, I_D=6A,$ $V_{GS}=10V$ , (Note4,5)	—	50	—	nC
Gate-Source Charge	$Q_{gs}$		—	13	—	nC
Gate-Drain Charge	$Q_{gd}$		—	11	—	nC
<b>Drain-Source Body Diode Characteristics and Maximum Ratings</b>						
Continuous Diode Forward Current	$I_S$	$V_G = V_D = 0V$ , Force Current	—	—	20	A
Pulsed Diode Forward Current	$I_{SM}$		—	—	80	A
Diode Forward Voltage	$V_{SD}$	$I_S=1A, V_{GS}=0V$	—	—	1.0	V

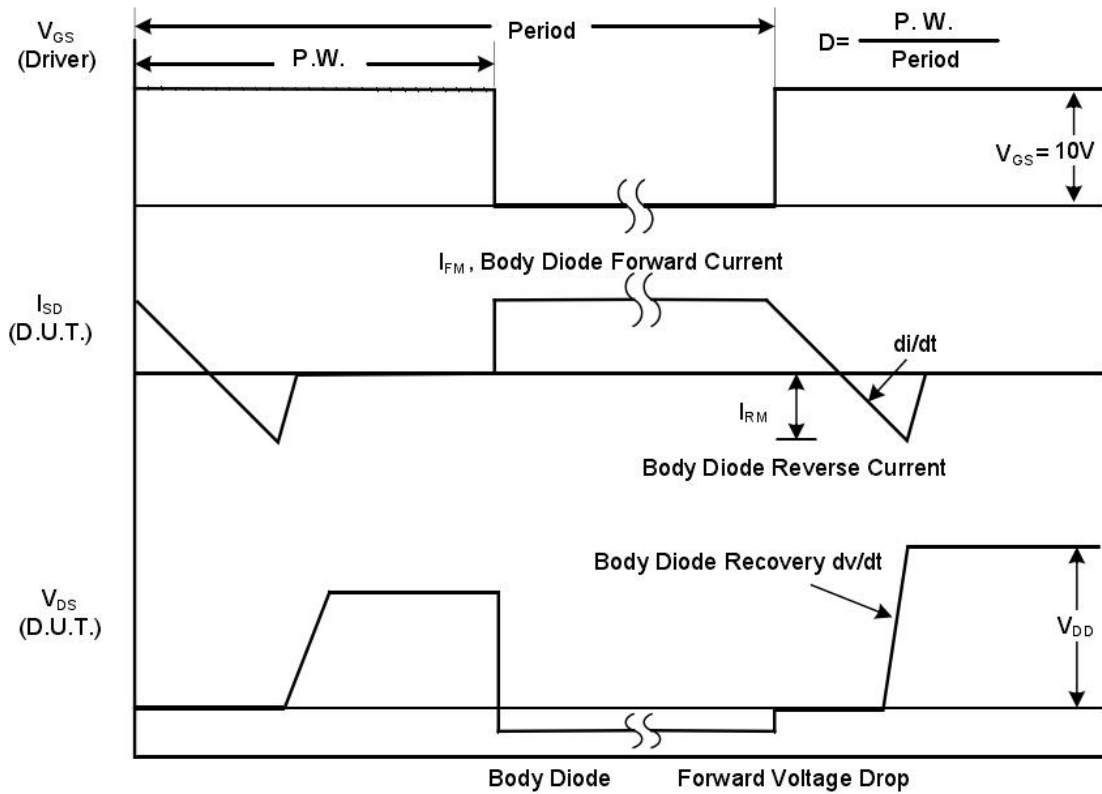
#### Notes

1. Repetitive Rating: pulse width limited by maximum junction temperature.
2.  $V_{DD}=25V, L=0.1\text{mH}, R_g=25\Omega, I_{AS}=20A$ , starting  $T_J=25^\circ\text{C}$ .
3.  $I_{SD} \leq I_D, dI/dt=200A/\mu s, V_{DD} \leq BV_{DSS}$ , starting  $T_J=25^\circ\text{C}$ , Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
4. Repetitive rating; pulse width limited by maximum junction temperature.

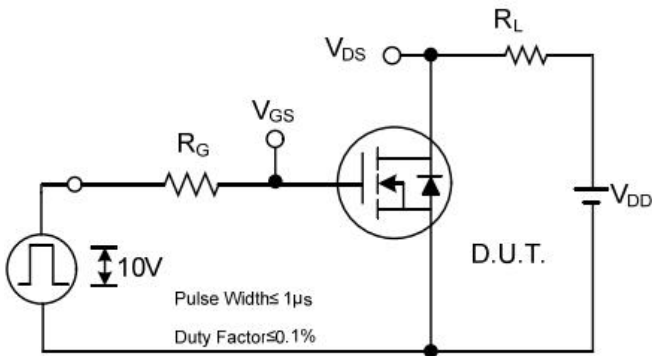
## RATING AND CHARACTERISTIC CURVES



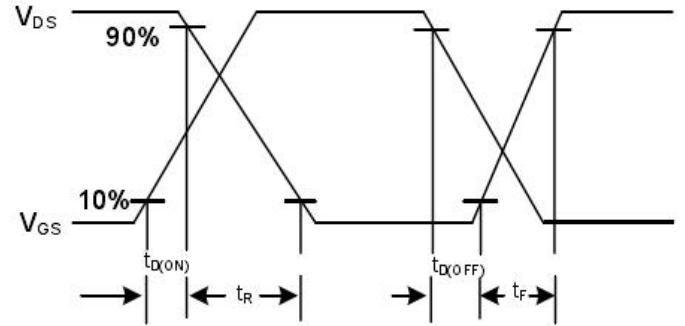
Peak Diode Recovery dv/dt Test Circuit



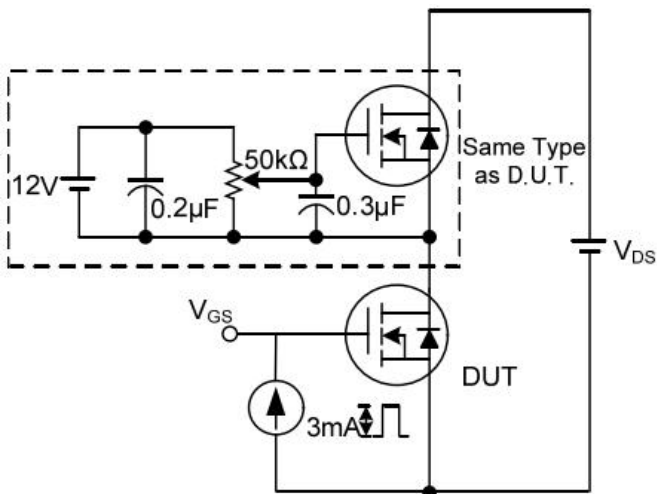
Peak Diode Recovery dv/dt Waveforms



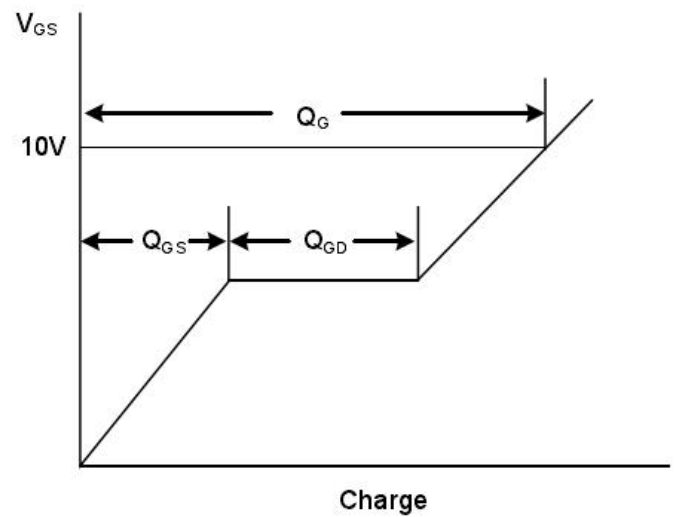
**Switching Test Circuit**



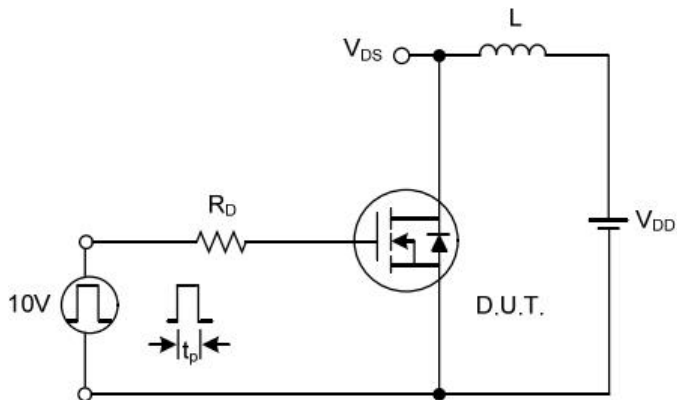
**Switching Waveforms**



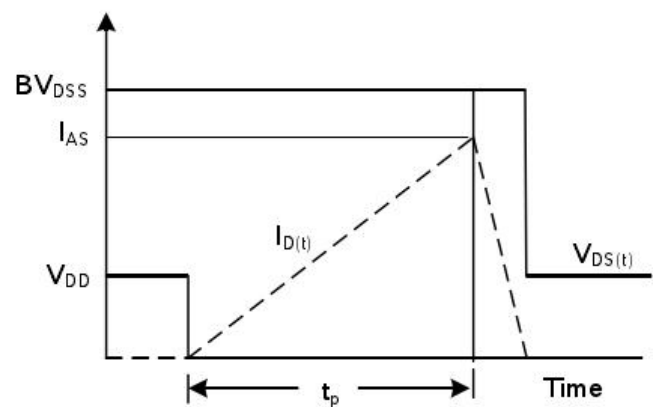
**Gate Charge Test Circuit**



**Gate Charge Waveform**



**Unclamped Inductive Switching Test Circuit**



**Unclamped Inductive Switching Waveforms**

## RATING AND CHARACTERISTIC CURVES

