D20N06E

20 Amps,55 Volts N-CHANNEL Power MOSFET

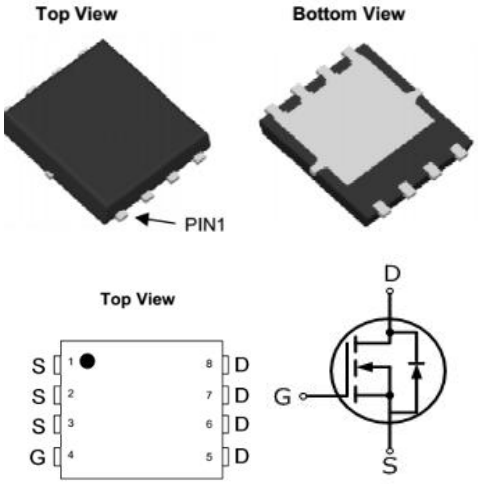
FEATURE

- 20A,55V,$R_{DS(ON)MAX}$=15mΩ V_{GS}=10V/5A
- Low gate charge
- Low C_{iss}
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

APPLICATION

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

DFN5*6



GENERAL DESCRIPTION

The D20N06E is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.
The D20N06E meet the RoHS and Green product requirement,100% EAS guaranteed with full function reliability approved.

Absolute Maximum Ratings(T_C=25℃,unless otherwise noted)

Parameter	Symbol	D20N06E	UNIT
Drain-Source Voltage	V_{DSS}	55	V
Gate-Source Voltage	V_{GSS}	±20	
Continuous Drain Current	I_D	20	A
Pulsed Drain Current(Note1)	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	℃
Channel Temperature	T_{CH}	150	℃
Maximum lead temperature for soldering purposes, 1/8″from case for 5 seconds	T_L	260	℃

Thermal Characteristics

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

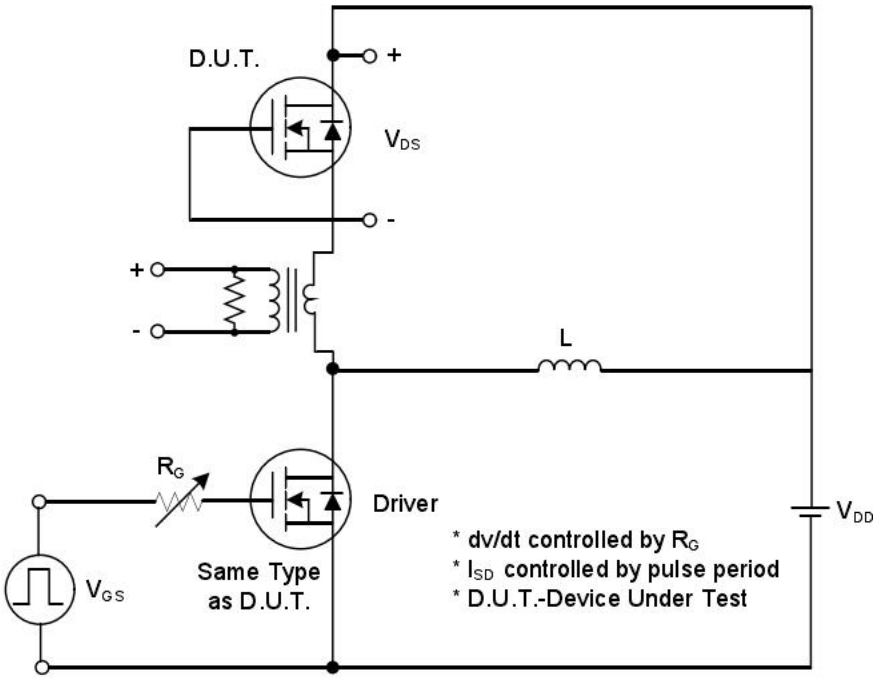
Electrical Characteristics (T_c=25℃,unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=250uA	55	—	—	V
Breakdown Temperature Coefficient	ΔBV_{DSS} /ΔT_J	Reference to 25℃, I_D=250uA	—	0.036	—	V/℃
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=55V_{GS}=0V	—	—	1	μA
	I_{DSS}	V_{DS}=55V_{GS}=0V（T_J =55℃）	—	—	5	μA
Gate-Body Leakage Current,Forward	I_{GSS}	V_{GS}=±20V_{DS}=0V	—	—	±100	nA
On Characteristics						
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS}=10V,I_D=250uA	1	—	3	V
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=5A	—	11.5	15	mΩ
		V_{GS}=4.5V,I_D=5A	—	12.7	17	
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=30V,V_{GS}=0V, f=1.0MHZ	—	1340	—	pF
Output Capacitance	C_{oss}		—	123	—	pF
Reverse Transfer Capacitance	C_{rss}		—	10	—	pF
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	V_{DD}=30V,R_G=3Ω, R_L=1.5Ω V_{GS}=10V (Note4,5)	—	6	—	ns
Turn-On Rise Time	t_r		—	2.5	—	ns
Turn-Off Delay Time	$t_{d(off)}$		—	22	—	ns
Turn-Off Fall Time	t_f		—	2.5	—	ns
Total Gate Charge	Qg	V_{DS}=30V,I_D=20A, V_{GS}=10V, (Note4,5)	—	21	—	nC
Gate-Source Charge	Qgs		—	4.7	—	nC
Gate-Drain Charge	Qgd		—	2.6	—	nC
Drain-Source Body Diode Charcteristics and Maximum Ratings						
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	V

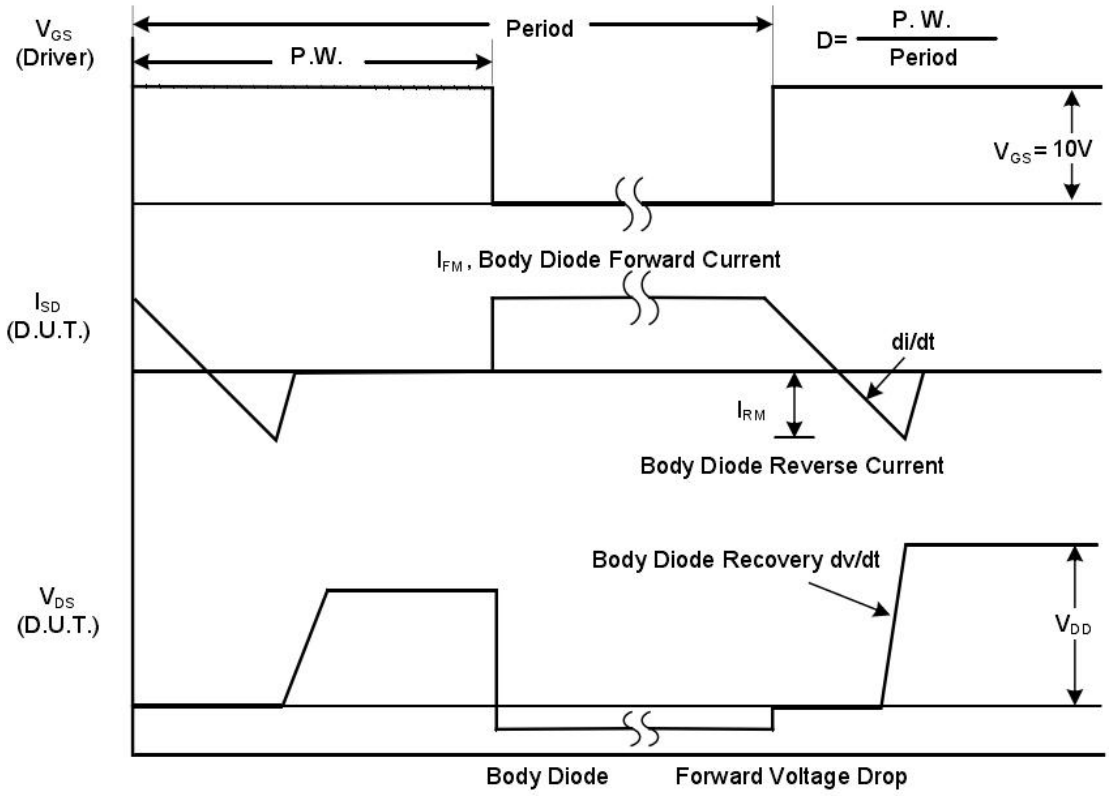
Notes

1. Repetitive Rating:pulse width limited by maximum junction temperature.
2. V_{DD}=25V,L=0.1mH,R_g=25Ω,I_{AS}=20A , starling T_J=25℃.
3. I_{SD}≤I_D,dI/dt=200A/us,V_{DD}≤BV_{DSS},starting T_J=25℃， Pulse width≤300us;duty cycle≤2%.
4. Repetitive rating; pulse width limited by maximum junction temperature.

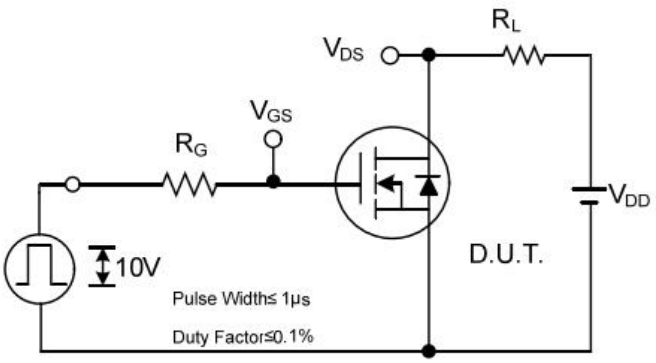
RATINGAND CHARACTERISTIC CURVES



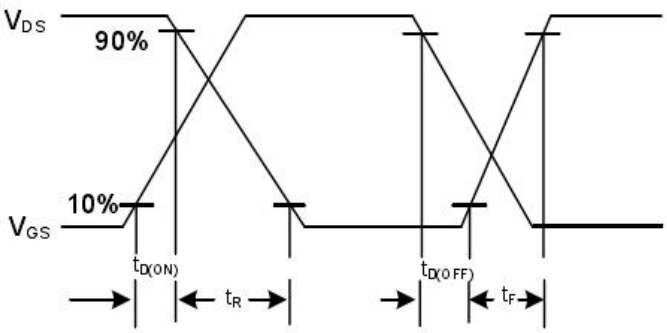
Peak Diode Recovery dv/dt Test Circuit



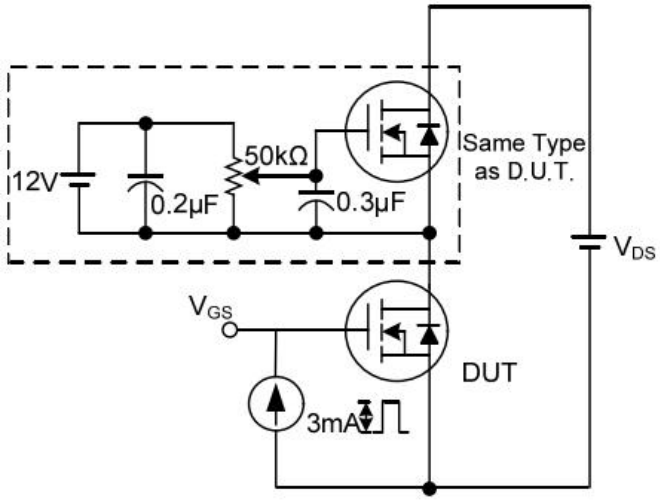
Peak Diode Recovery dv/dt Waveforms



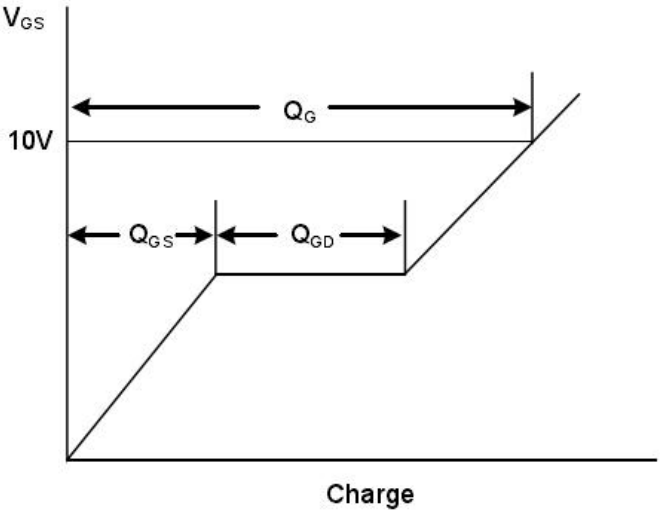
Switching Test Circuit



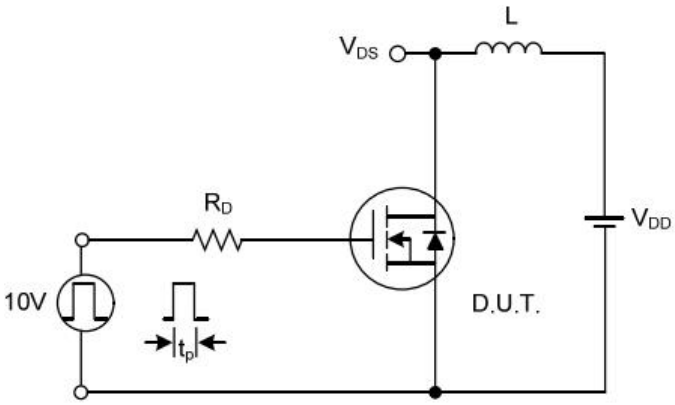
Switching Waveforms



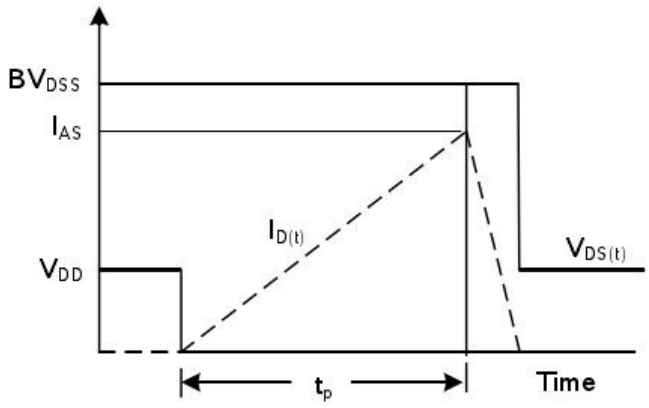
Gate Charge Test Circuit



Gate Charge Waveform

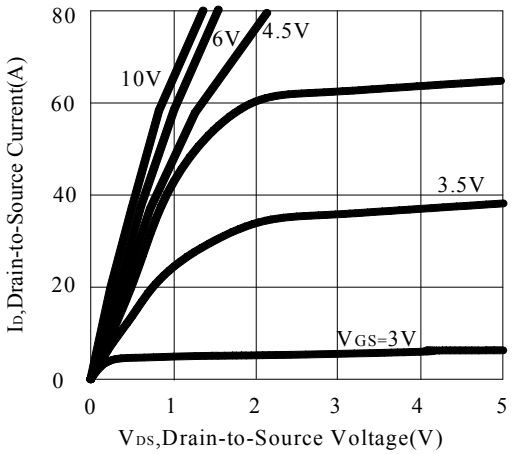


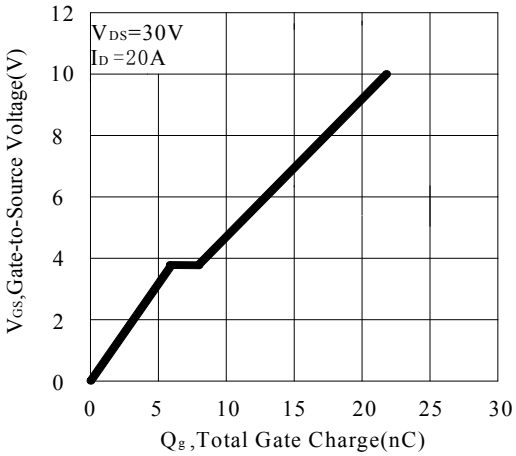
Unclamped Inductive Switching Test Circuit

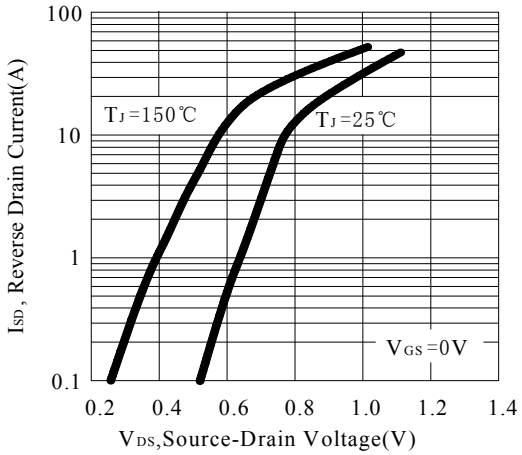


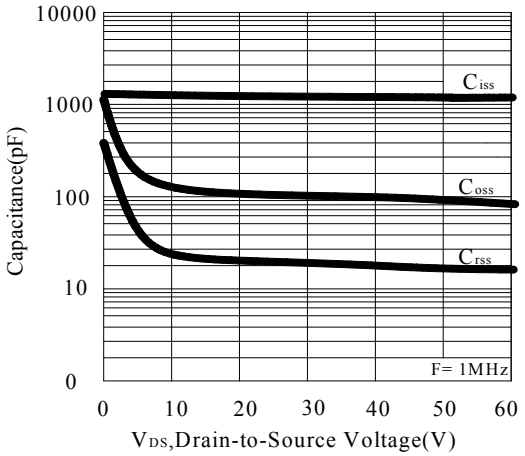
Unclamped Inductive Switching Waveforms

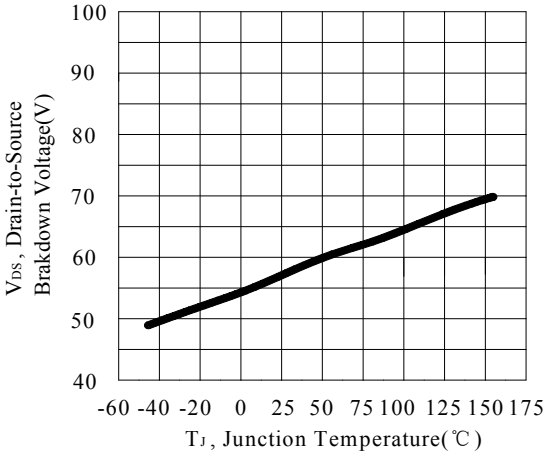
RATINGAND CHARACTERISTIC CURVES

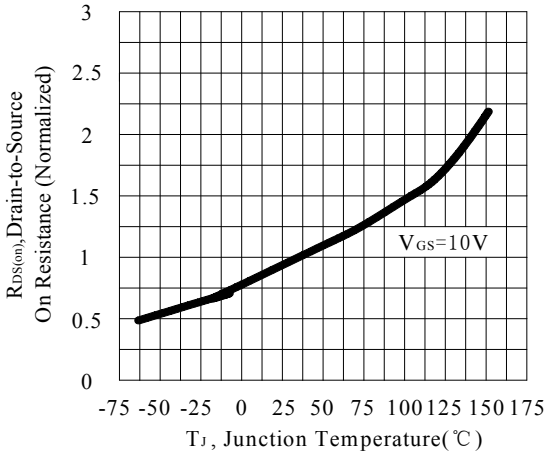


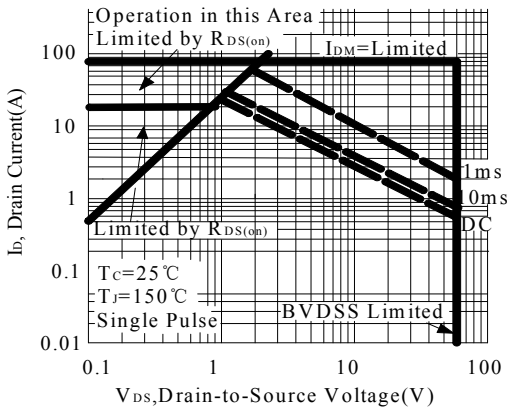


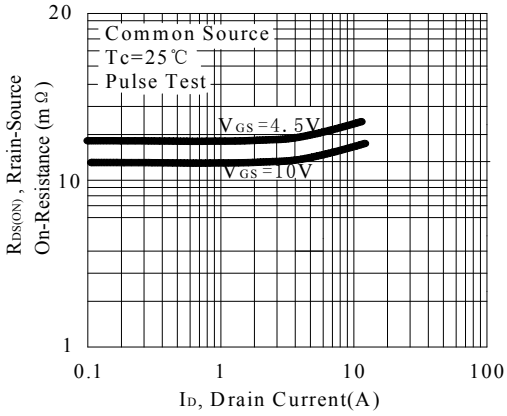


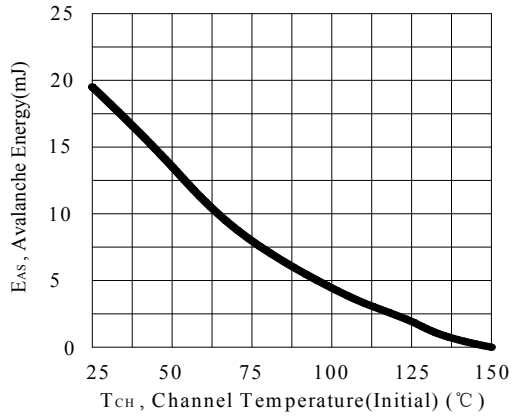


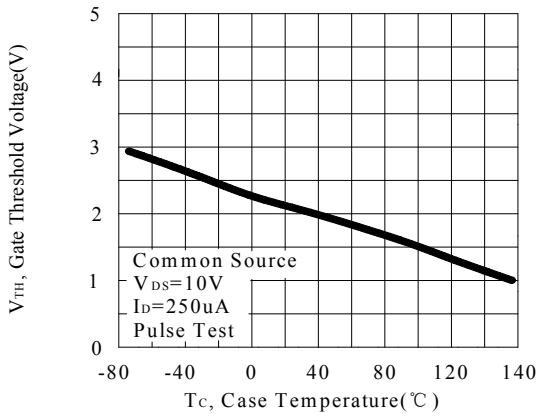


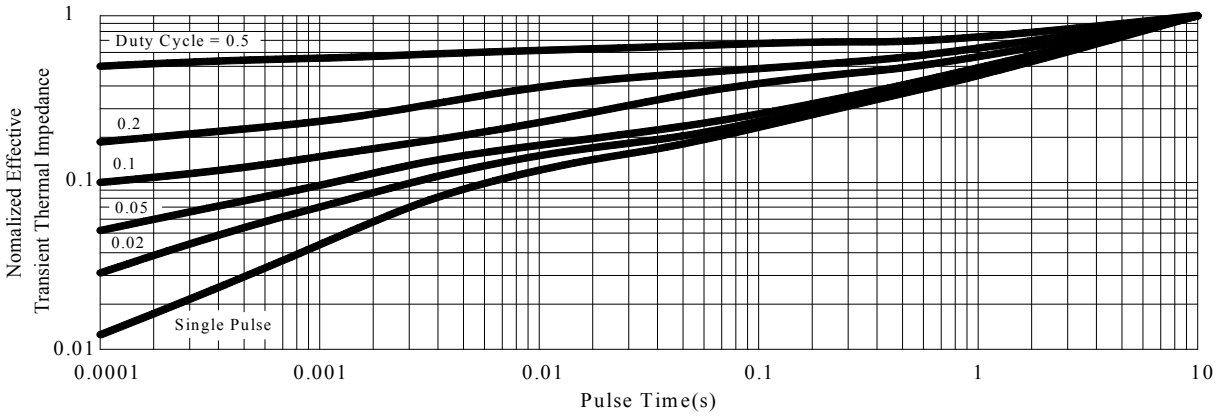



Operation in this Area
Limited by RDS(on)
IDM=Limited
1ms
10ms
DC
Limited by RDS(on)
TC=25℃
TJ=150℃
Single Pulse
BVDSS Limited
ID, Drain Current(A)
VDS,Drain-to-Source Voltage(V)


Common Source
Tc=25℃
Pulse Test
VGS=4.5V
VGS=10V
RDS(ON) , Rrain-Source On-Resistance (mΩ)
ID, Drain Current(A)


EAS , Avalanche Energy(mJ)
TCH , Channel Temperature(Initial) (℃)


Common Source
VDS=10V
ID=250uA
Pulse Test
VTH, Gate Threshold Voltage(V)
TC, Case Temperature(℃)


Duty Cycle = 0.5
0.2
0.1
0.05
0.02
Single Pulse
Nomalized Effective Transient Thermal Impedance
Pulse Time(s)