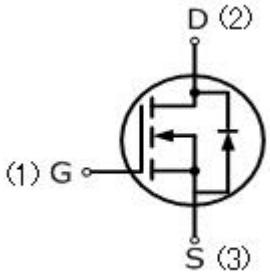
MOSFET

21 Amps,30 Volts N-CHANNEL MOSFET

FEATURE

- 21A,30V,$R_{DS(ON)MAX}$=3.6mΩ@VGS=10V/10.5A
  $R_{DS(ON)MAX}$=5.1mΩ@VGS=4.5V/10.5A
- Low gate charge
- Low C_{iss}
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



SOP-8L

Absolute Maximum Ratings(T_C=25℃,unless otherwise noted)			
Parameter	**Symbol**	**21N03P**	**UNIT**
Drain-Source Voltage	V_{DSS}	30	V
Gate-Source Voltage	V_{GSS}	±20	
Continuous Drain Current	I_D	21	A
Pulsed Drain Current(Note1)	I_{DM}	170	
Single Pulse Avalanche Energy (Note 2)	E_{AS}	350	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55to+150	℃
Maximum lead temperature for soldering purposes, 1/8″from case for 5 seconds	T_L	260	℃

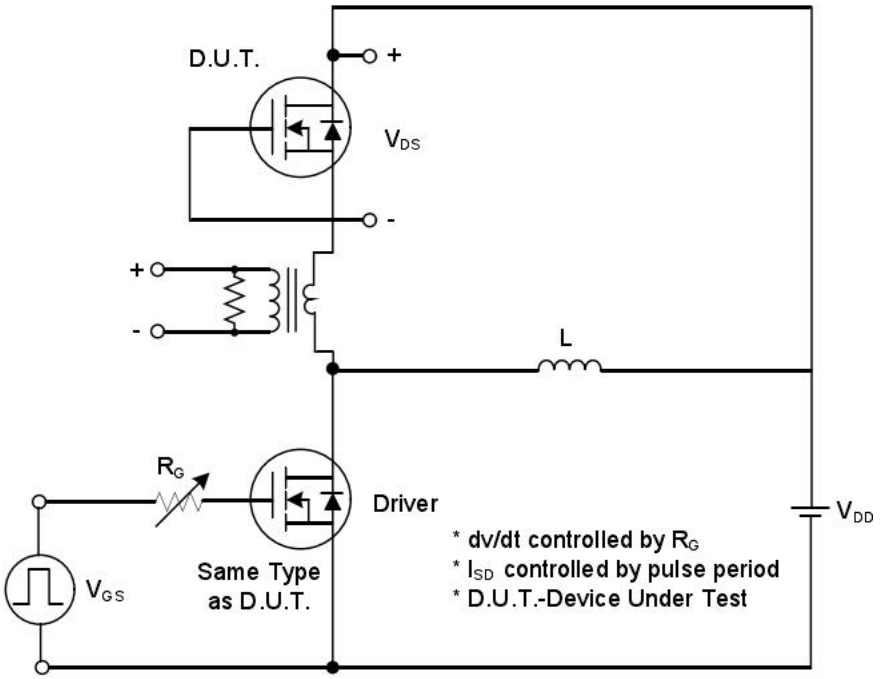
Thermal Characteristics				
Parameter		**Symbol**	**MAX**	**Units**
Thermal resistance , Channel to Case		$R_{th(ch-c)}$	24	℃/W
Maximum Power Dissipation	T_C=25℃	P_D	3.1	W

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	30	—	—	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=24V,V_{GS}=0V	—	—	1	uA
Gate-Body Leakage Current,Forward	I_{GSSF}	V_{GS}=20V,V_{DS}=0V	—	—	100	nA
Gate-Body Leakage Current,Reverse	I_{GSSR}	V_{GS}=-20V,V_{DS}=0V	—	—	-100	nA
On Characteristics						
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	1.3	—	2.2	V
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=10.5A	—	2.9	3.6	mΩ
		V_{GS}=4.5V,I_D=10.5A	—	4.1	5.1	
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=15V,V_{GS}=0V, f=1.0MHZ	—	3747	—	pF
Output Capacitance	C_{oss}		—	460	—	pF
Reverse Transfer Capacitance	C_{rss}		—	398	—	pF
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	V_{DD}=15V,I_D=1A,R_L=15Ω R_G=3Ω,V_{GEN}=10V (Note3,4)	—	22.4	—	ns
Turn-On Rise Time	t_r		—	19.1	—	ns
Turn-Off Delay Time	$t_{d(off)}$		—	81.3	—	ns
Turn-Off Fall Time	t_f		—	13.7	—	ns
Total Gate Charge	Qg	V_{DD}=10V,I_D=30A, V_{GS}=10V, (Note3,4)	—	74	—	nC
Gate-Source Charge	Qgs		—	15.1	—	nC
Gate-Drain Charge	Qgd		—	17.5	—	nC
Drain-Source Body Diode Characteristics and Maximum Ratings						
Diode Forward Voltage	V_{SD}	I_S=10.5A,V_{GS}=0V	—	—	1.2	V
Reverse Recovery Time	t_{rr}	I_F=21A, dI_F/dt=100A/us	—	30	—	ns
Reverse Recovery Charge	Qrr		—	35	—	nC

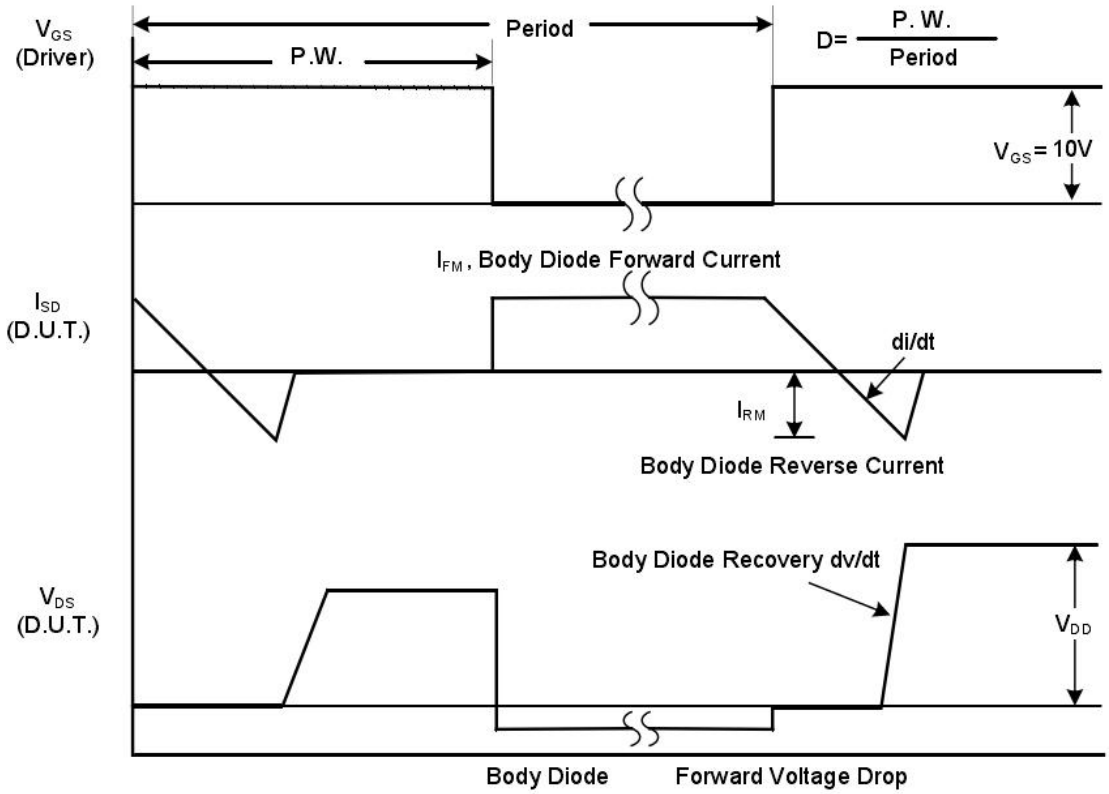
Notes

1. Repetitive Rating:pulse width limited by maximum junction temperature.
2. V_{DD}=24V,L=0.5mH,R_g=25Ω, 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.

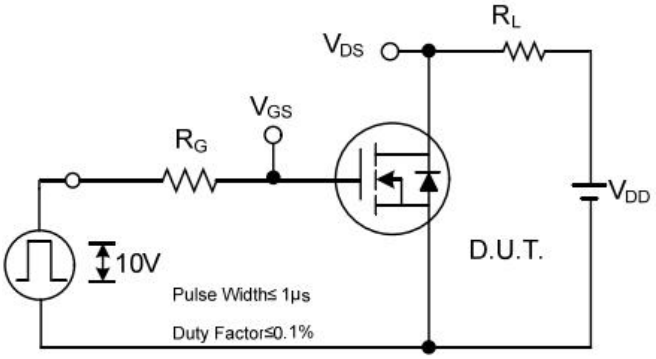
TEST CIRCUIT AND WAVEFORM



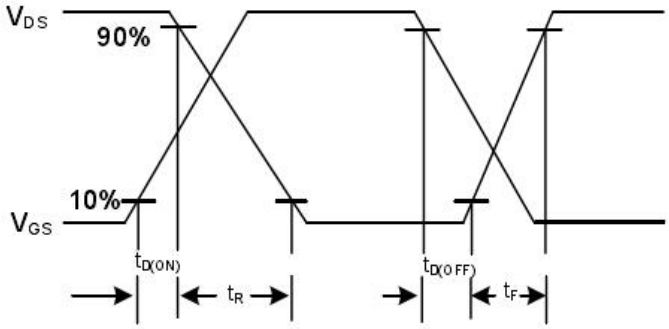
Peak Diode Recovery dv/dt Test Circuit



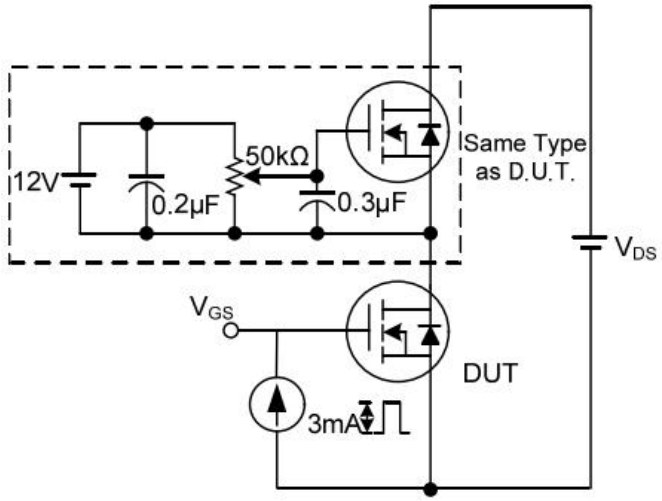
Peak Diode Recovery dv/dt Waveforms



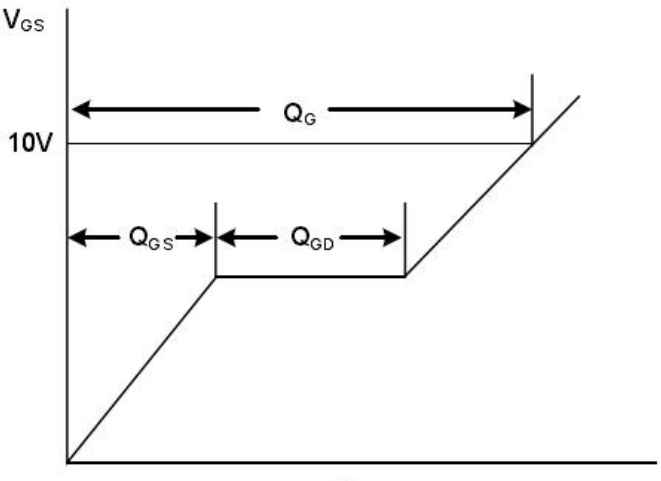
Switching Test Circuit



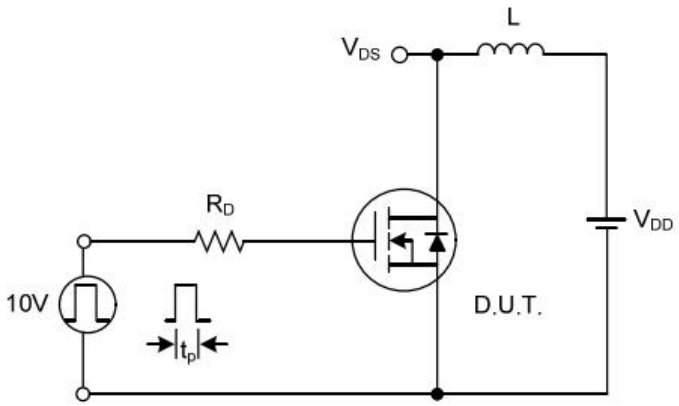
Switching Waveforms



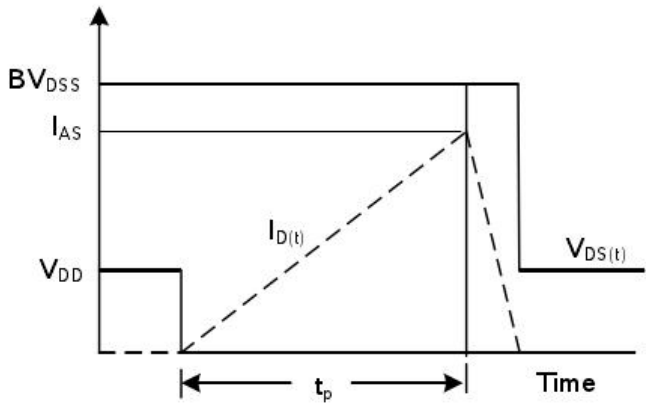
Gate Charge Test Circuit



Gate Charge Waveform

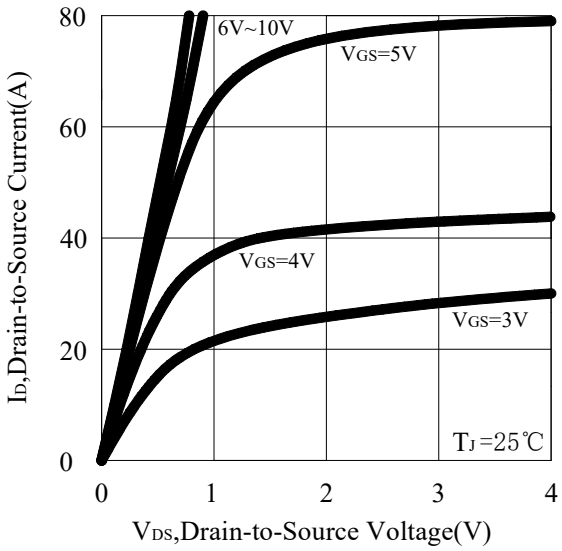


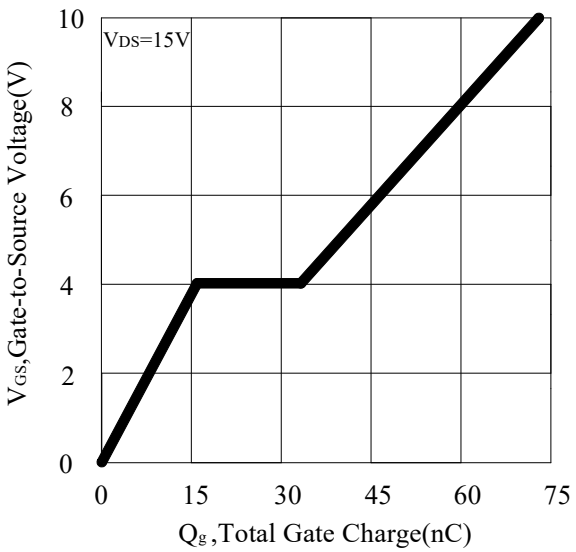
Unclamped Inductive Switching Test Circuit

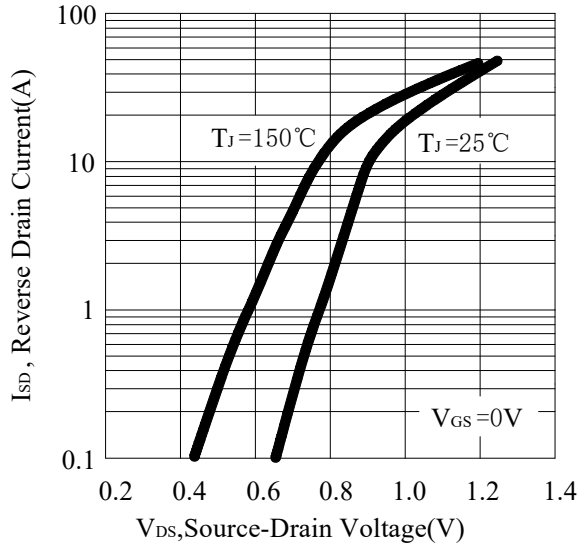


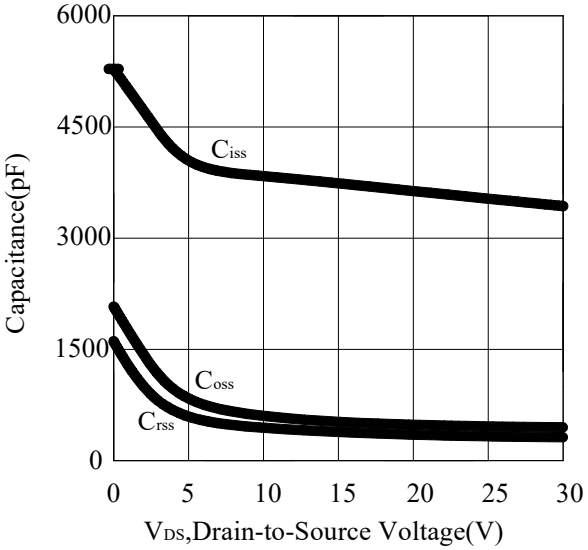
Unclamped Inductive Switching Waveforms

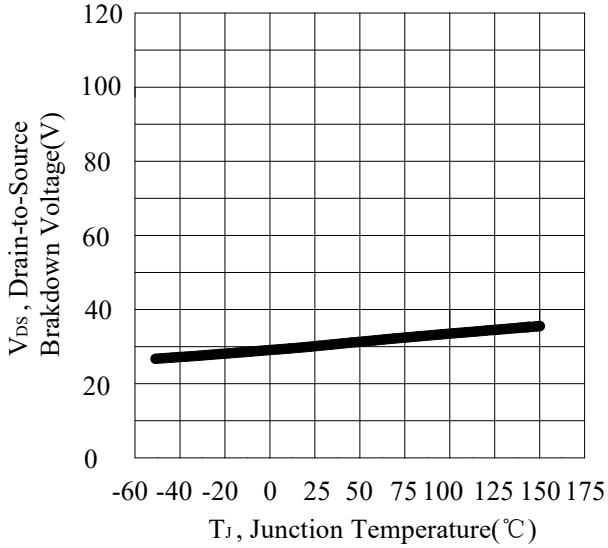
RATINGAND CHARACTERISTIC CURVES

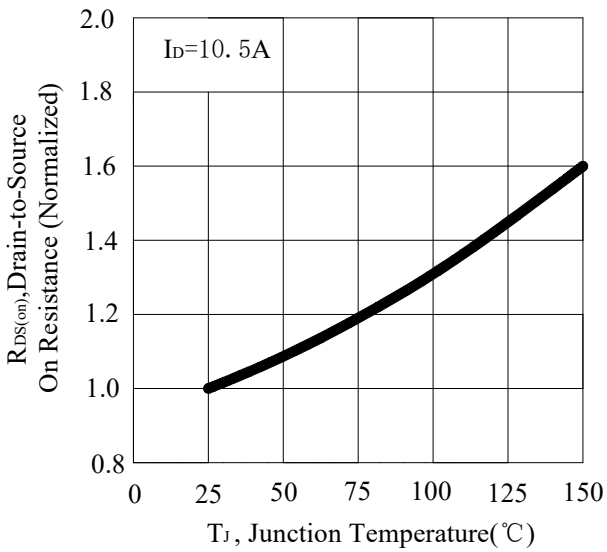


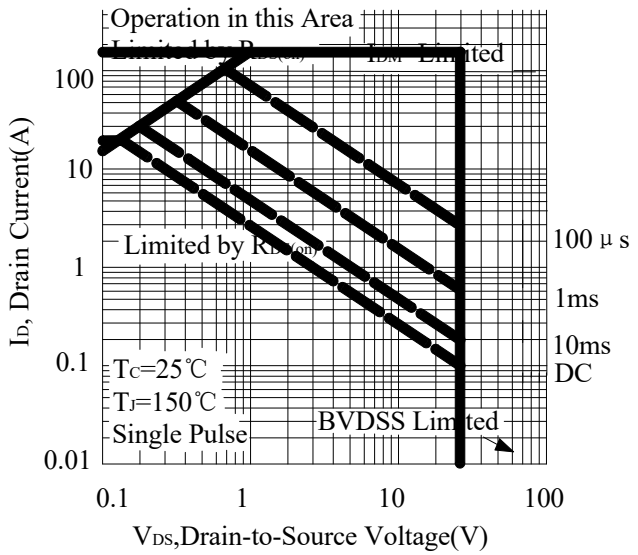


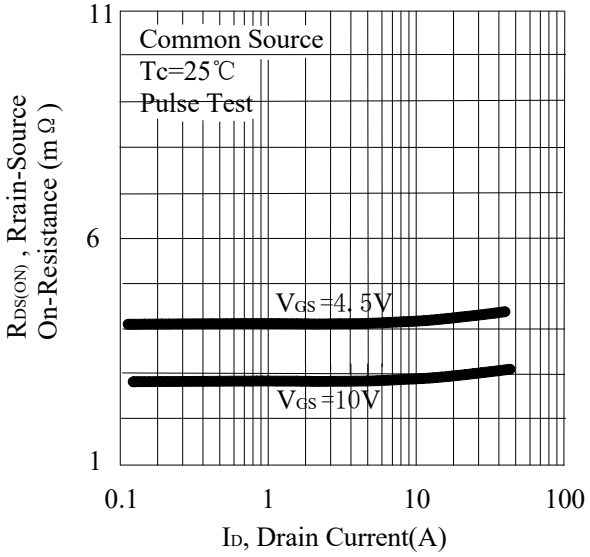


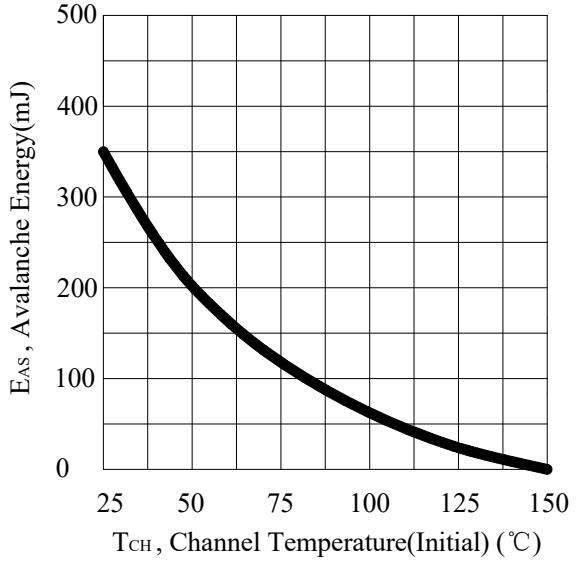


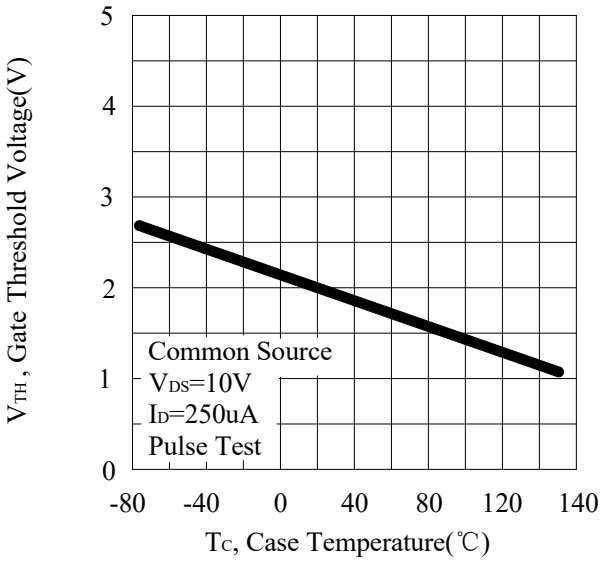


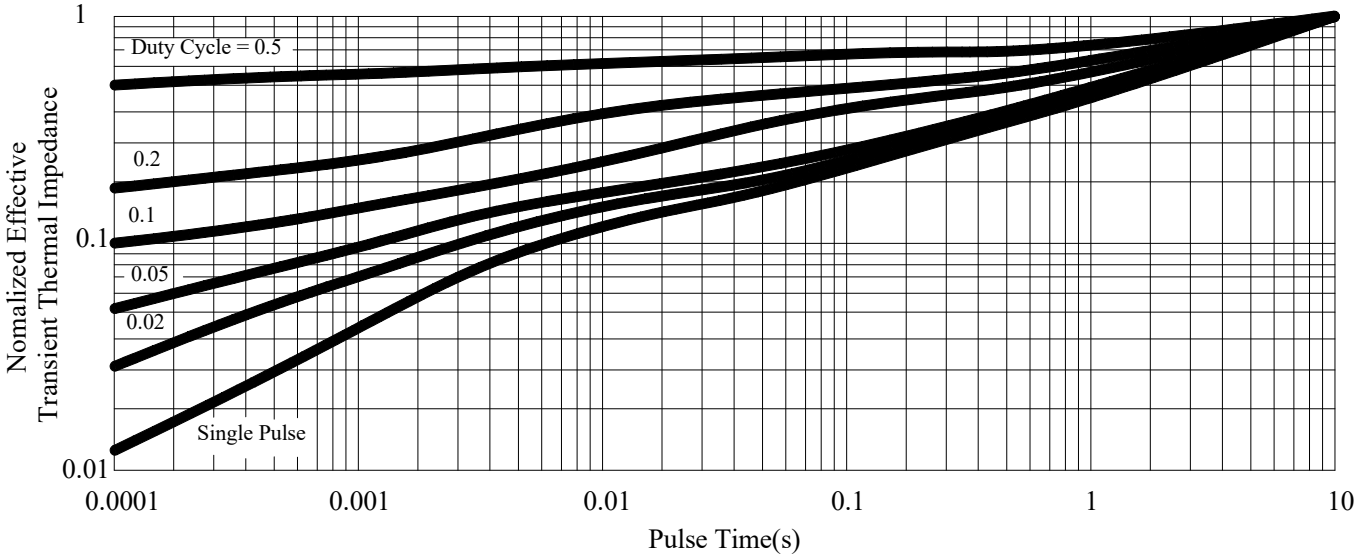



Operation in this Area
Limited by RDS(on)
IDM Limited
100 μ s
1ms
10ms
DC
Limited by RDS(on)
TC=25℃
TJ=150℃
Single Pulse
BVDSS Limited
ID, Drain Current(A)
VDS,Drain-to-Source Voltage(V)

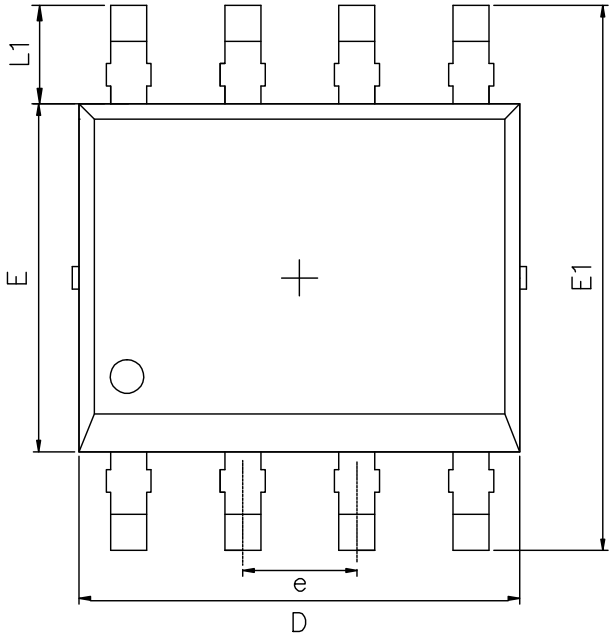

Common Source
Tc=25℃
Pulse Test
VGS =4. 5V
VGS =10V
RDS(ON) , Rrain-Source On-Resistance (m Ω)
ID, Drain Current(A)

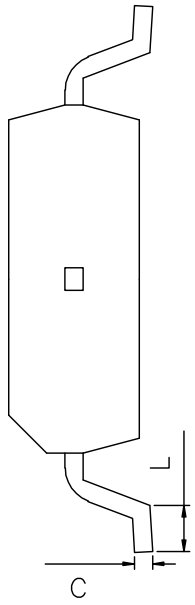

EAS , Avalanche Energy(mJ)
TCH , Channel Temperature(Initial) (℃)

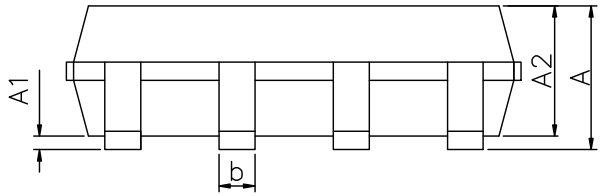

Common Source
VDS=10V
ID=250uA
Pulse Test
VTH , Gate Threshold Voltage(V)
TC, Case Temperature(℃)


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

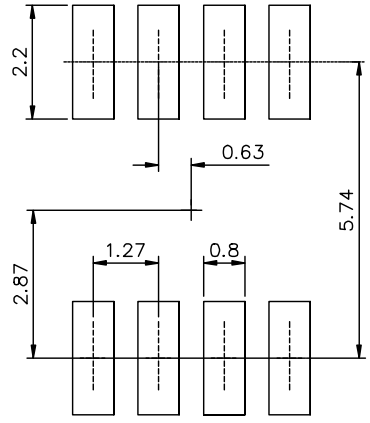
SOP-8 PACKAGE OUTLINE







RECOMMENDED LAND PATTERN



UNIT: mm

	MIN	NOM	MAX
A	1.35	1.65	1.75
A1	0.10	0.15	0.25
A2	1.25	1.45	1.65
b	0.30	0.40	0.50
c	0.17	0.20	0.25
D	4.80	4.90	5.10
E	3.72	3.87	4.02
E1	5.95	6.10	6.25
e		1.27BCS	
L	0.40	0.65	0.90
L1	0.92	1.07	1.22