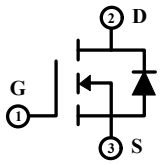
18A 200V N-channel Enhancement Mode Power MOSFET

1 Description

This N-channel enhanced vdmosfets, is obtained by the self-aligned planar technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. Which accords with the RoHS standard.



V_{DSS} = 200V

$R_{DS(on)\ (TYP)}$= 0.12Ω

I_D = 18A

TO-252B

2 Features

- Fast switching
- Low on resistance
- Low gate charge
- Low reverse transfer capacitances
- 100% single pulse avalanche energy test
- 100% ΔV_{DS} test

3 Applications

- High efficiency switch mode power supplies.
- Power switch circuit of adaptor and charger.
- UPS
- Inverter

4 Electrical Characteristics

4.1 Absolute Maximum Rating (Tc=25℃,unless otherwise noted)

Parameter		Symbol	Rating	Units
Drian-to-Source Voltage		V_{DSS}	200	V
Gate-to-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current	T_C=25℃	I_D	18	A
	T_C=100℃		11.3	A
Pulsed Drain Current(1)		I_{DM}	72	A
Single Pulse Avalanche Energy(4)		E_{AS}	500	mJ
Peak Diode Recovery dv/dt(5)		dv/dt	5	V/ns
Power Dissipation	T_a=25℃	P_{tot}	1.25	W
	T_C=25℃	P_{tot}	100	W
Junction Temperature Range		T_j	-55～150	℃
Storage Temperature Range		T_{stg}	-55～150	℃
Maximum Temperature for soldering		T_L	300	℃

4.2 Thermal Characteristics

Parameter	Symbol	Rating	Unit
Thermal Resistance,Junction to Case-sink	R_{thJC}	1.25	℃/W
Thermal Resistance,Junction to Ambient	R_{thJA}	100	℃/W

4.3 Electrical Characteristics（Tc=25℃,unless otherwise noted）

Parameter	Symbol	Test Condition	Value			Units
			Min	Typ	Max	
Off Characteristics						
Drain-to-Source Breakdown Voltage	BV_{DSS}	I_D=250μA,V_{GS}=0V	200	--	--	V
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=200V,V_{GS}=0V,T_C=25℃	--	--	10	μA
		V_{DS}=160V,V_{GS}=0V,T_C=125℃	--	--	100	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±30V	--	--	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2	--	4	V
Drain-to-Source on-state Resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=9A	--	0.12	0.18	Ω
Forward Transfer Conductance	g_{fs}	V_{DS}=15V,I_D=9A	--	8.5	--	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{GS}=0V,V_{DS}=25V,f=1.0MHz	--	1136	--	pF
Output Capacitance	C_{oss}		--	183	--	
Reverse Transfer Capacitance	C_{rss}		--	16.4	--	
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	I_D=18A, V_{DD}=100V, V_{GS}=10V, R_G=10Ω	--	19	--	nS
Turn-on Rise Time	t_r		--	33	--	
Turn-off Delay Time	$t_{d(off)}$		--	35	--	
Turn-off Fall Time	t_f		--	8	--	
Total Gate Charge	Q_g	I_D=18A,V_{DD}=160V,V_{GS}=10V	--	20.4	--	nC
Gate-to-Source Charge	Q_{gs}		--	6.9	--	
Gate-to-Drain(“Miller”) Charge	Q_{gd}		--	7.3	--	
Drain-Source Diode Characteristics						
Diode Forward Voltage(3)	V_{FSD}	V_{GS}=0V,I_S=18A	--	--	1.5	V
Diode Forward Current	I_S		--	--	18	A
Reverse Recovery Time(3)	t_{rr}	T_J=25℃,I_F=18A, dI_F/dt=100A/μS,V_{GS}=0V	--	187	--	nS
Reverse Recovery Charge(3)	Q_{rr}		--	925	--	nC

Notes：

1: Repetitive rating, pulse width limited by maximum junction temperature.

2: Surface mounted on FR4 Board, t≤10sec.

3: Pulse width ≤ 300μs, duty cycle ≤ 2%.

4. L=10mH,I_D=10A,V_{DD}=50V,V_{GATE}=200V,Start T_J=25℃.

5. I_{SD}=18A,di/dt≤100A/μs,V_{DD}≤BV_{DSS}, Start T_J=25℃.

5 Typical characteristics diagrams

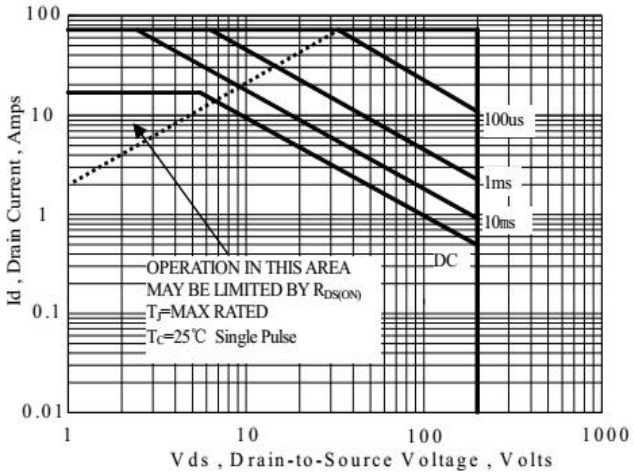


Figure 1 Maximum Forward Bias Safe Operating Area

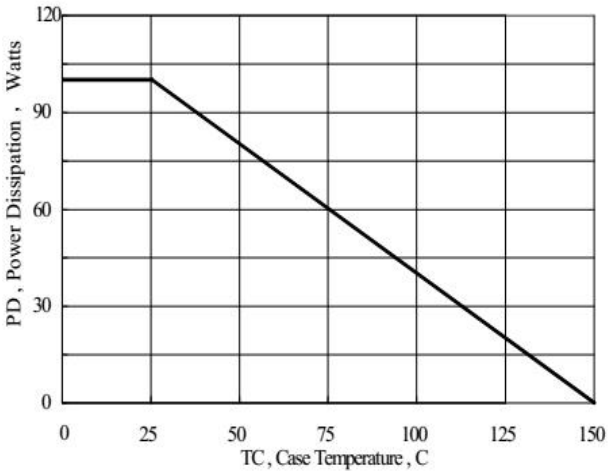


Figure 2 Maximum Power Dissipation vs Case Temperature

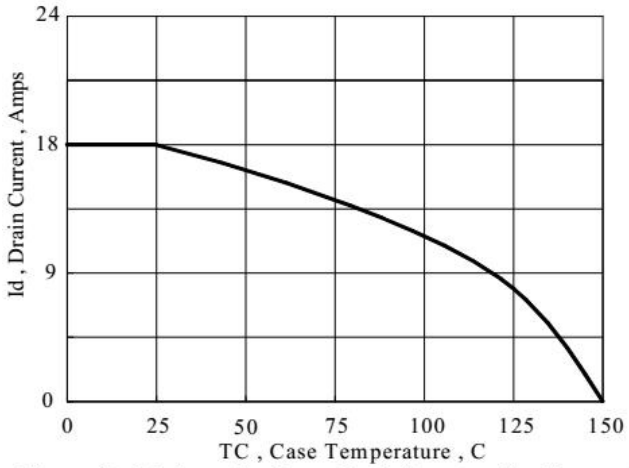


Figure 3 Maximum Continuous Drain Current vs Case Temperature

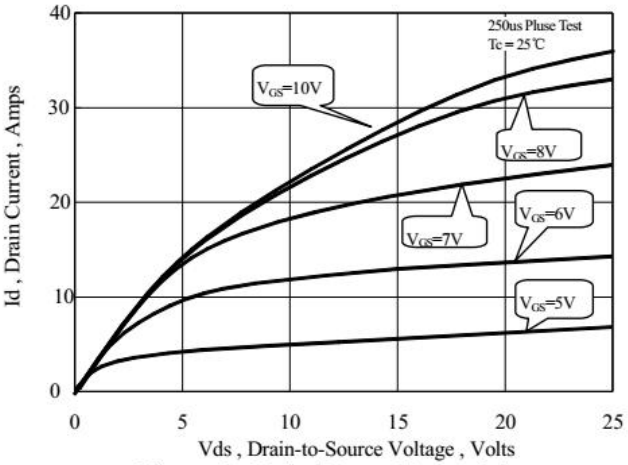


Figure 4 Typical Output Characteristics

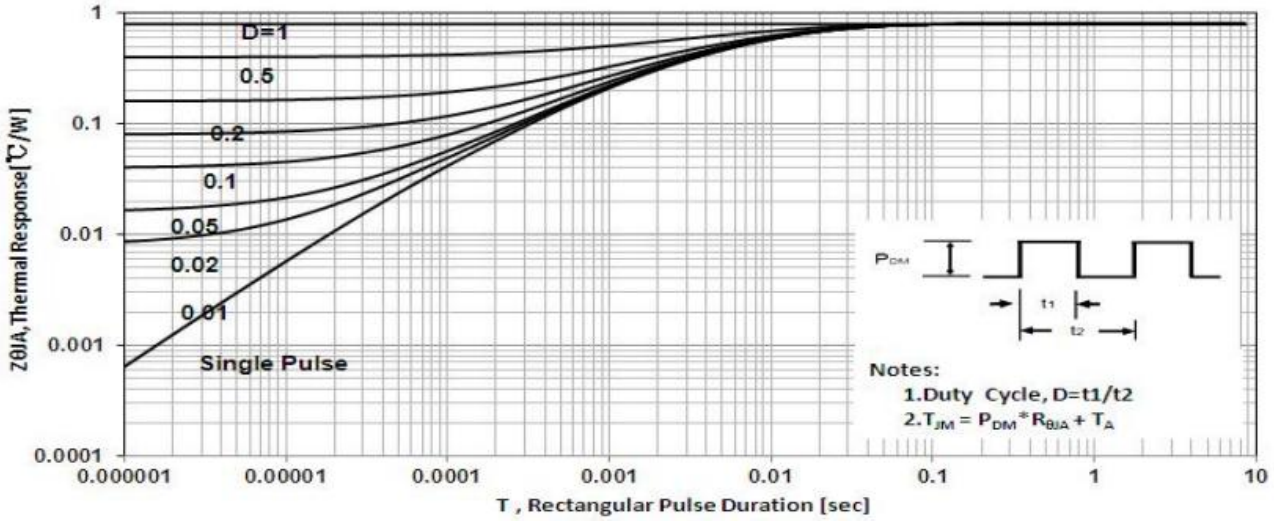


Figure 5 Maximum Effective Thermal Impendance , Junction to Case

5 Typical characteristics diagrams(continues)

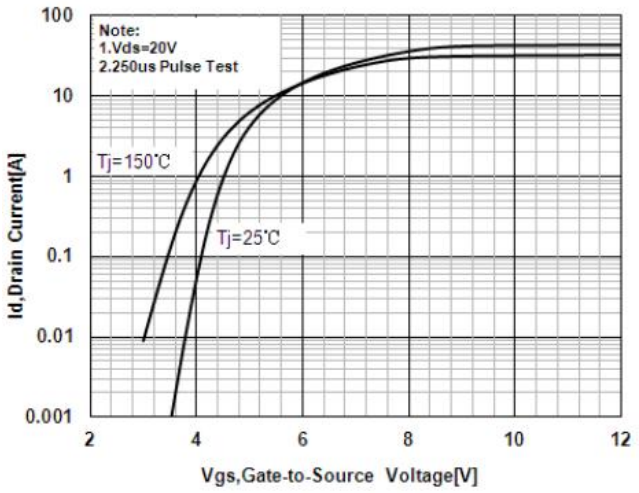


Figure 6 Typical Transfer Characteristics

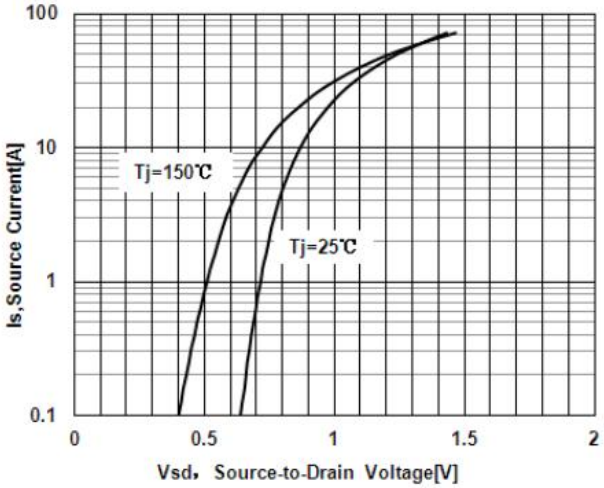


Figure 7 Typical Body Diode Transfer Characteristics

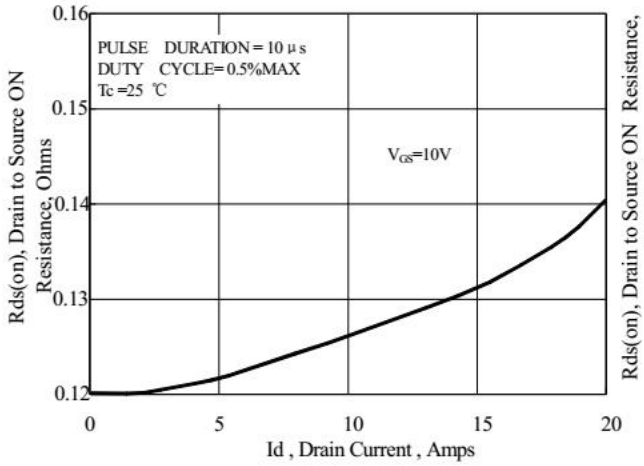


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

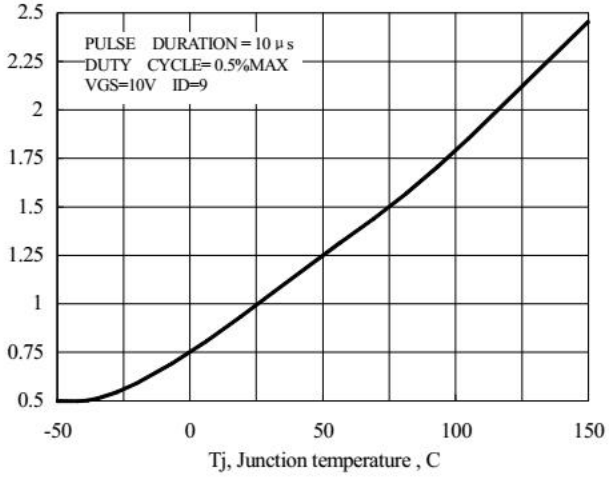


Figure 9 Typical Drian to Source on Resistance vs Junction Temperature

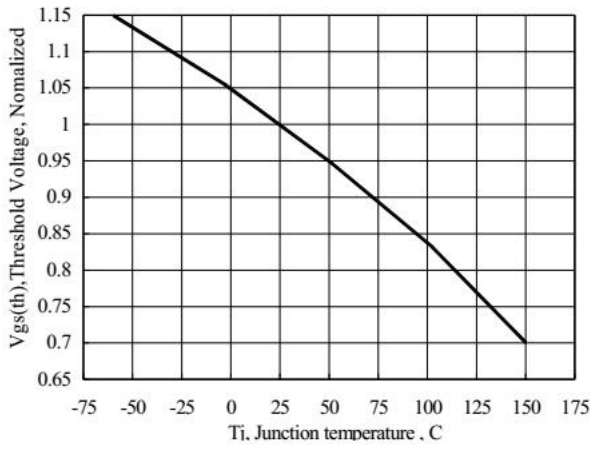


Figure 10 Typical Theshold Voltage vs Junction Temperature

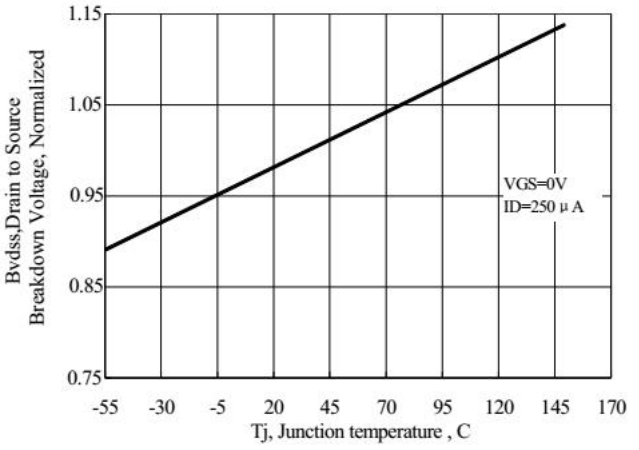


Figure 11 Typical Breakdown Voltage vs Junction Temperature

5 Typical characteristics diagrams(continues)

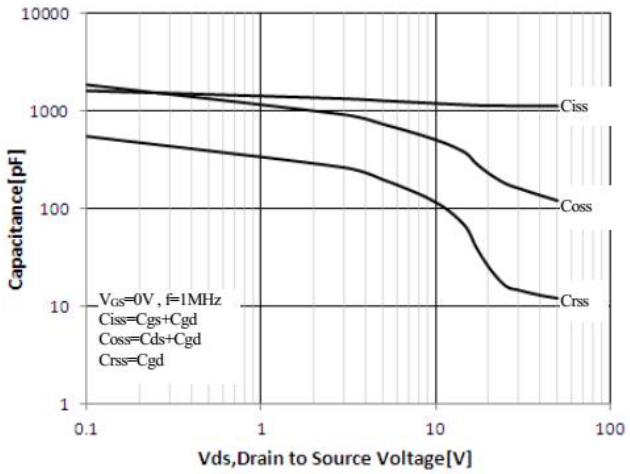


Figure 12 Typical Capacitance vs Drain to Source Voltage

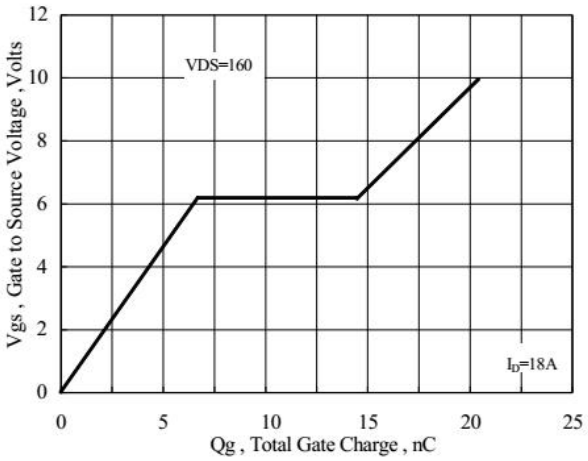
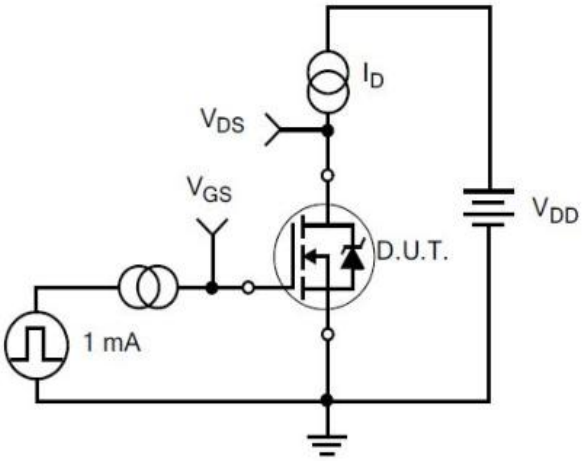
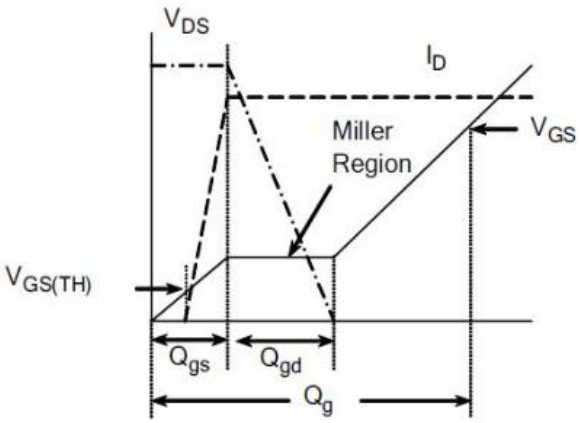


Figure 13 Typical Gate Charge vs Gate to Source Voltage

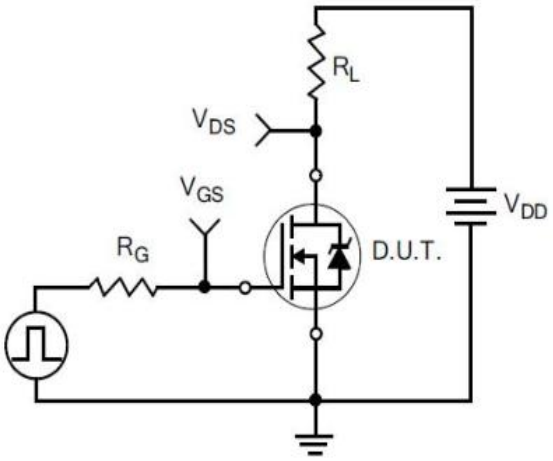
6 Typical Test Circuit and Waveform



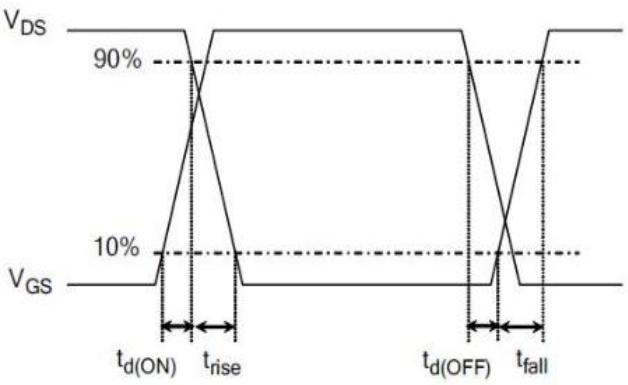
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

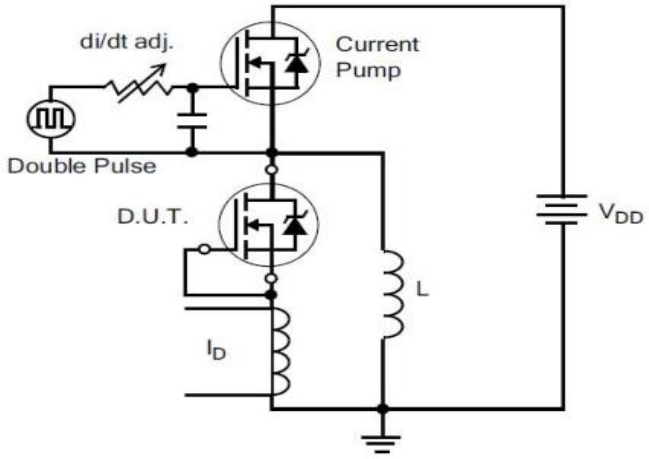


3) Resistive Switching Test Circuit

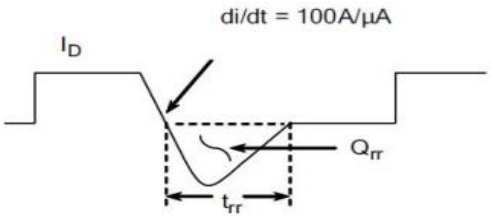


4) Resistive Switching Waveforms

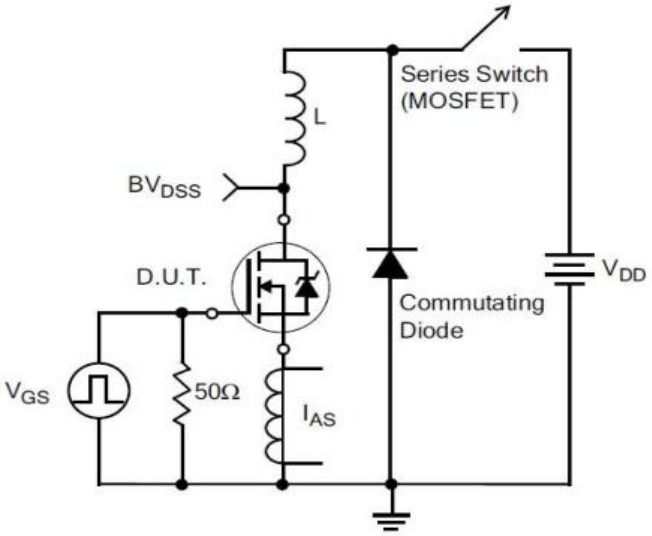
6 Typical Test Circuit and Waveform(continues)



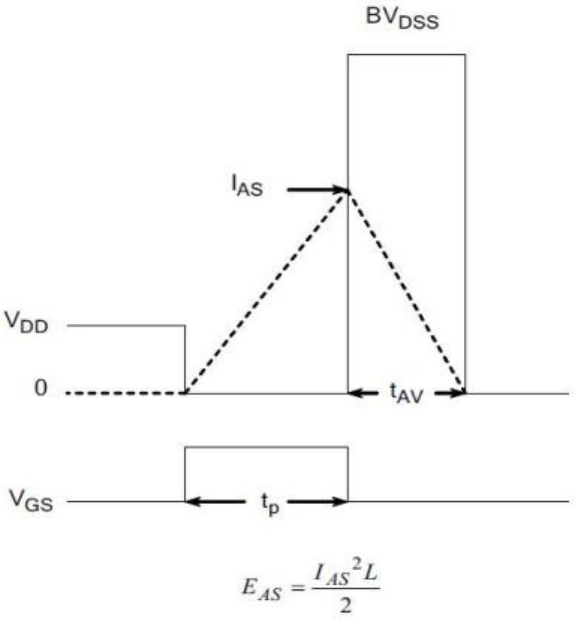
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



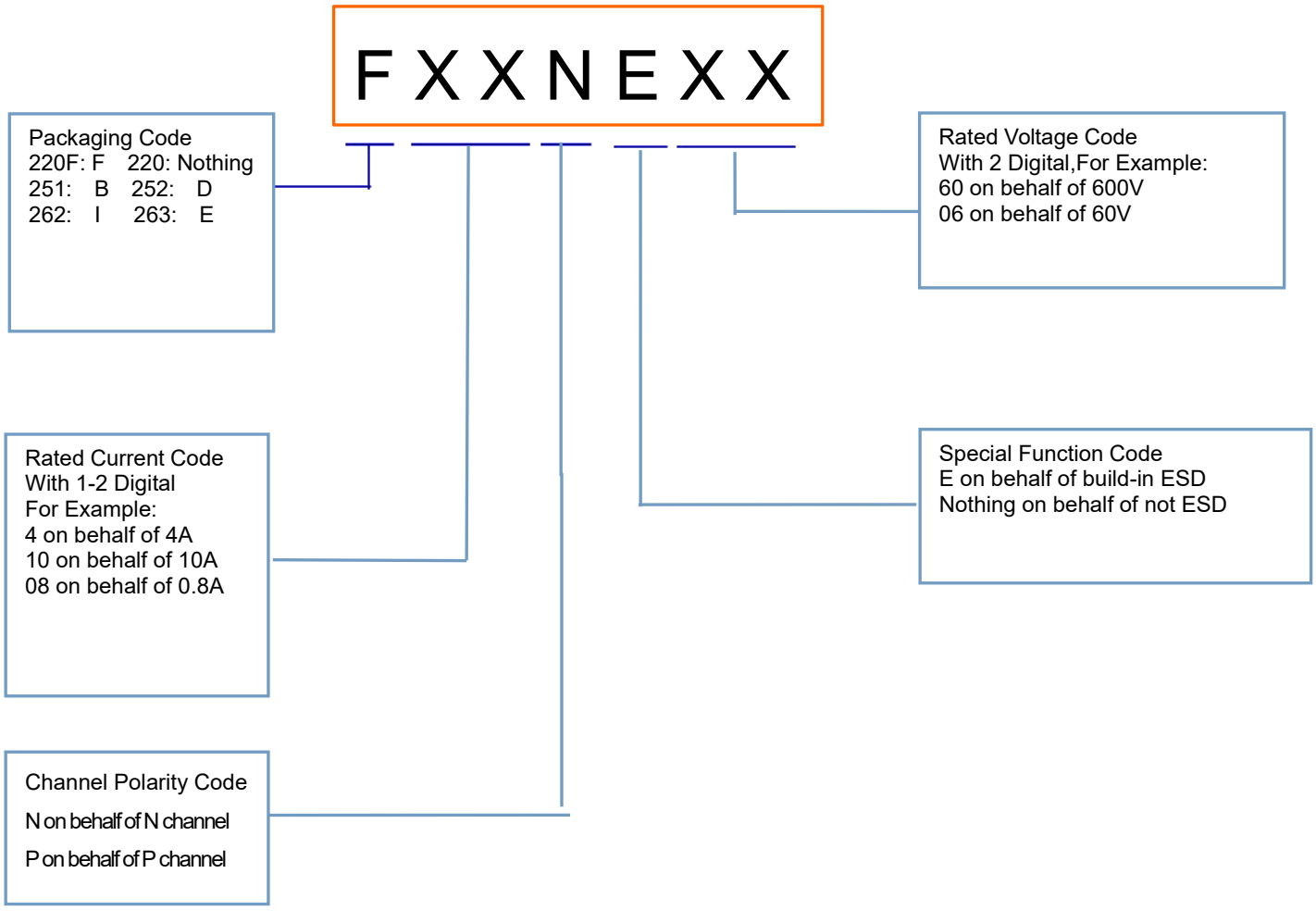
7) . Unclamped Inductive Switching Test Circuit



$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

8) Unclamped Inductive Switching Waveforms

7 Product Names Rules

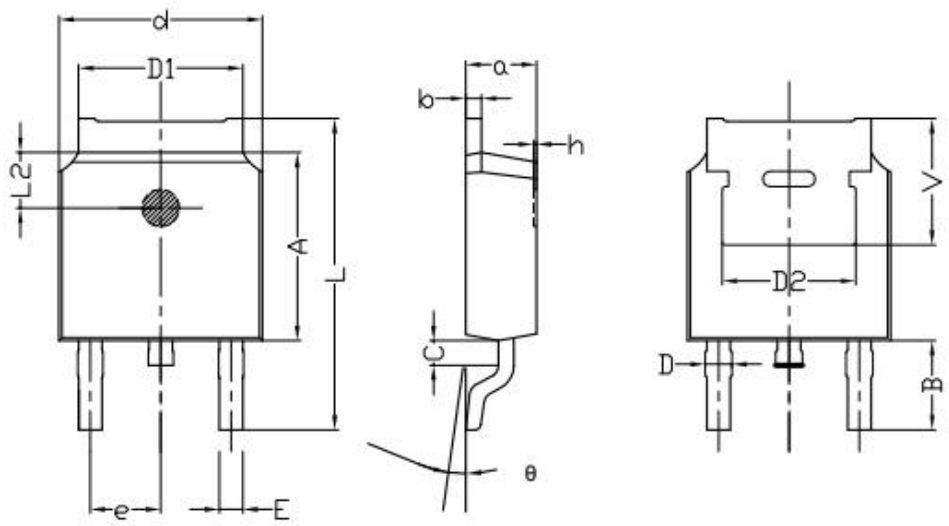


8 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	RoHS	Package	Quantity
D18N20	TO-252	D18N20	Pb-free	Tape & Reel	2500/box

9 Dimensions

TO-252B PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
a	2.20	2.40	0.087	0.095
b	0.46	0.58	0.018	0.023
c	0.70	0.90	0.028	0.035
D	0.80	1.00	0.032	0.039
d	6.30	6.70	0.248	0.264
D1	5.00	5.50	0.197	0.217
D2	TYP 4.83		TYP 0.190	
A	5.80	6.20	0.228	0.244
e	2.19	2.39	0.086	0.094
L	9.40	10.40	0.370	0.409
B	2.6	3.2	0.102	0.126
L2	1.5	1.8	0.059	0.071
θ	0	8	0	8
h	0	0.3	0	0.012
V	5.25	5.85	0.207	0.230
E	0.6	0.8	0.024	0.032

10 Attentions

- Jiangsu Donghai Semiconductor Technology CO.,LTD. reserves the right to change the specification without prior notice! The customer should obtain the latest version of the information before making the order and verify that the information is complete and up to date.
- It is the responsibility of the purchaser for any failure or failure of any semiconductor product under certain conditions. It is the responsibility of the purchaser to comply with safety standards and to take safety measures in the system design and machine manufacturing of Donghai products in order to avoid potential risk of failure. Injury or property damage.
- Product promotion is endless, our company will be dedicated to provide customers with better products.

11 Appendix

Revision history:

Date	REV.	Description	Page
2017.05.14	1.0	Original	10