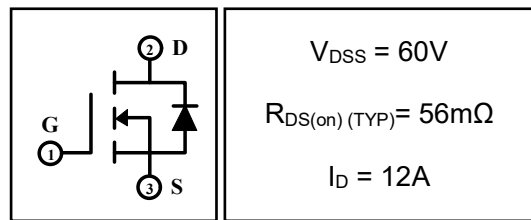


12A 60V N-channel Enhancement Mode Power MOSFET

1 Description

D12N06 is an N-channel enhancement mode power field-effect transistor. Using advanced trench technology design, providing excellent $R_{DS(on)}$ and low gate charge. The product can be used in a wide variety of application. The package form is TO-252. Which accords with the RoHS standard.



2 Features

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

3 Applications:

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply



4 Electrical Characteristics

4.1 Absolute Maximum Rating ($T_C=25^\circ C$, unless otherwise noted)

Parameter	Symbol	Rating	Units
Drain-to-Source Voltage	V_{DSS}	60	V
Gate-to-Source Voltage	V_{GSS}	± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ C$	12
		$T_C=100^\circ C$	8
Pulsed Drain Current ⁽¹⁾	I_{DM}	36	A
Power Dissipation	P_{tot}	$T_a=25^\circ C$	1.15
		$T_C=25^\circ C$	32.5
Junction Temperature Range	T_j	150	$^\circ C$
Storage Temperature Range	T_{stg}	-55 ~ 150	$^\circ C$
Maximum Temperature for soldering	T_L	300	$^\circ C$

4.2 Thermal Characteristics

Parameter	Symbol	Rating	Unit
Thermal Resistance, Junction to Case-sink	R_{thJC}	3.85	$^\circ C/W$
Thermal Resistance, Junction to Ambient	R_{thJA}	108.7	$^\circ C/W$

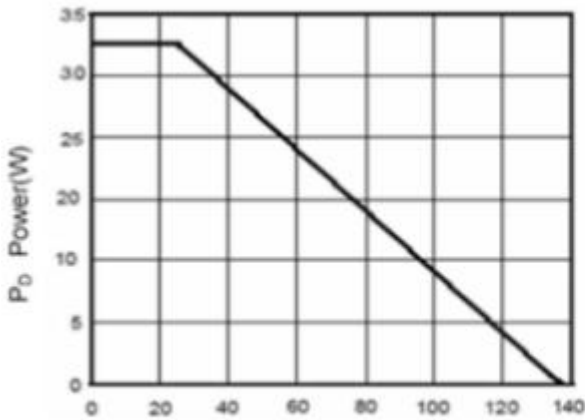
4.3 Electrical Characteristics (T_c=25°C, unless otherwise noted)

Parameter	Symbol	Test Condition	Value			Units
			Min	Typ	Max	
Off Characteristics						
Drain-to-Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	60	--	--	V
Drain-to-Source Leakage Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V, T _C =25°C	--	--	1	μA
		V _{DS} =48V, V _{GS} =0V, T _C =125°C	--	--	100	μA
Gate-to-Source Forward Leakage	I _{GSSF}	V _{GS} =20V, V _{DS} =0V	--	--	100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.3	2.0	V
Drain-to-Source on-state Resistance	R _{DS(on)}	V _{GS} =10V, I _D =4A	--	56	80	mΩ
Forward Transfer Conductance	g _{fs}	V _{DS} =15V, I _D =2A	--	3.0	--	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =30V, f=1.0MHz	--	247	--	pF
Output Capacitance	C _{oss}		--	34	--	
Reverse Transfer Capacitance	C _{rss}		--	19.5	--	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	I _D =1.5A, V _{DD} =30V, V _{GS} =10V, R _{GEN} =1Ω	--	6	--	nS
Turn-on Rise Time	t _r		--	15	--	
Turn-off Delay Time	t _{d(off)}		--	15	--	
Turn-off Fall Time	t _f		--	10	--	
Total Gate Charge	Q _g	I _D =3A, V _{DD} =30V, V _{GS} =4.5V	--	6	--	nC
Gate-to-Source Charge	Q _{gs}		--	1	--	
Gate-to-Drain("Miller") Charge	Q _{gd}		--	1.3	--	
Drain-Source Diode Characteristics						
Diode Forward Voltage ⁽³⁾	V _{FSD}	V _{GS} =0V, I _S =12A	--	--	1.2	V
Diode Forward Current	I _S		--	--	12	A

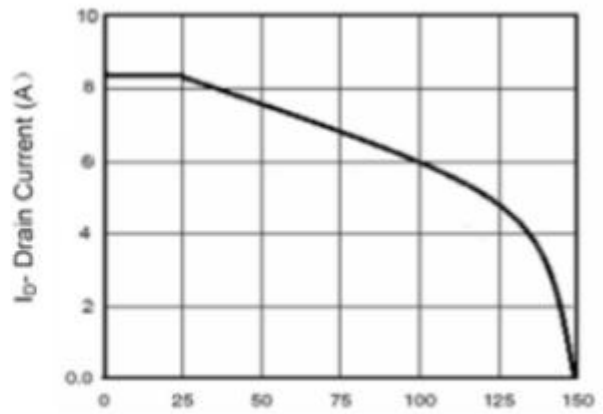
Notes:

- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board, t_s≤10sec.
- 3: Pulse width ≤ 300μs, duty cycle ≤ 2%.

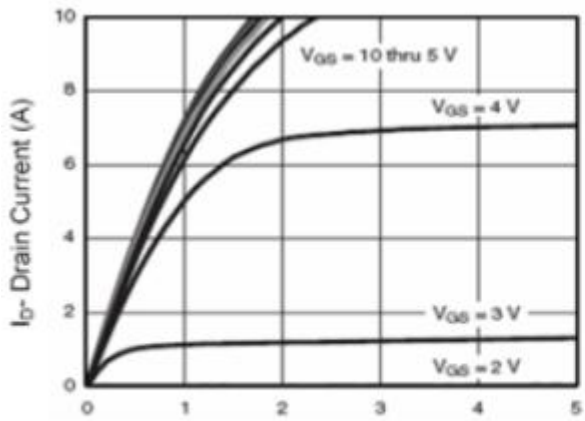
5 Typical characteristics diagrams



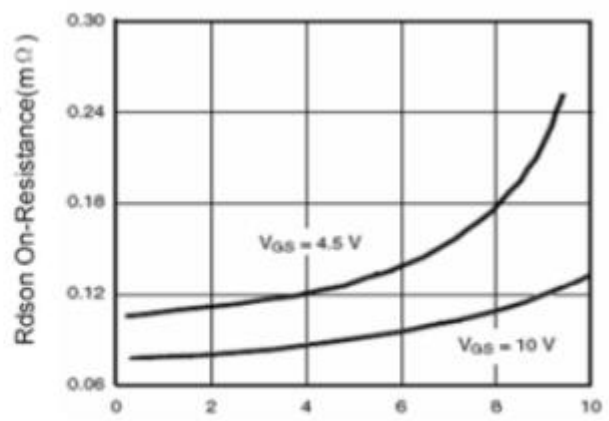
T_J -Junction Temperature(°C)
Figure 1 Power Dissipation



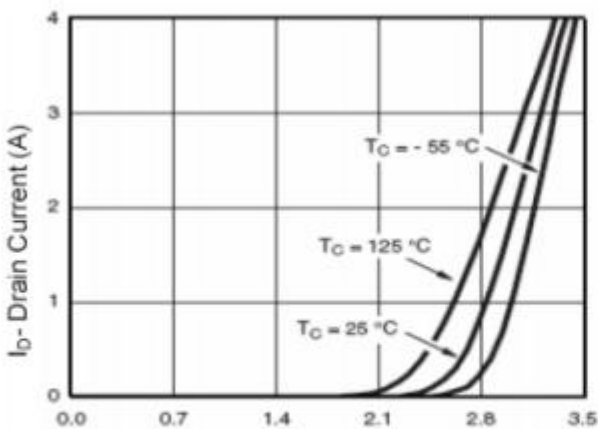
T_J -Junction Temperature(°C)
Figure 2 Drain Current



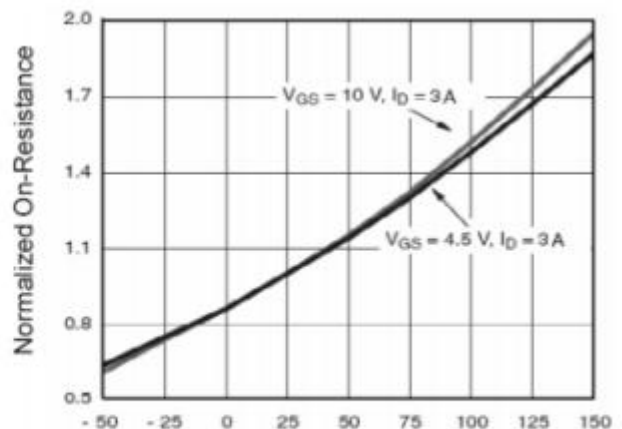
$V_{GS} = 10$ thru 5 V
 $V_{GS} = 4$ V
 $V_{GS} = 3$ V
 $V_{GS} = 2$ V
 V_{DS} Drain-Source Voltage (V)
Figure 3 Output Characteristics



$R_{DS(on)}$ On-Resistance(mΩ)
 $V_{GS} = 4.5$ V
 $V_{GS} = 10$ V
 I_D Drain Current (A)
Figure 4 Drain-Source On-Resistance

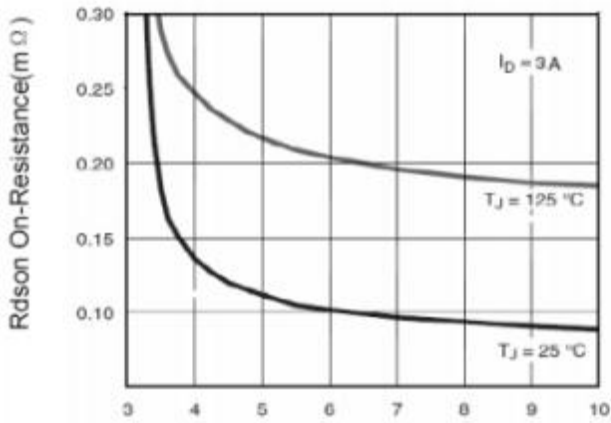


$T_C = -55^\circ C$
 $T_C = 125^\circ C$
 $T_C = 25^\circ C$
 V_{GS} Gate-Source Voltage (V)
Figure 5 Transfer Characteristics

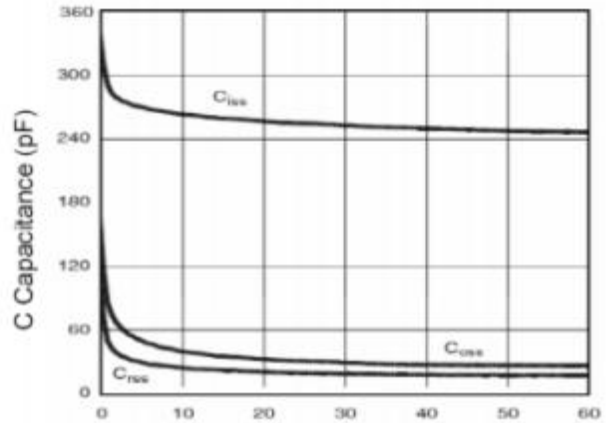


Normalized On-Resistance
 $V_{GS} = 10$ V, $I_D = 3$ A
 $V_{GS} = 4.5$ V, $I_D = 3$ A
 T_J -Junction Temperature(°C)
Figure 6 Drain-Source On-Resistance

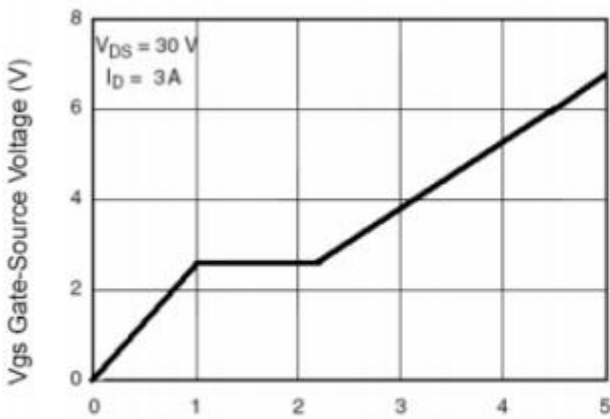
5 Typical characteristics diagrams(continues)



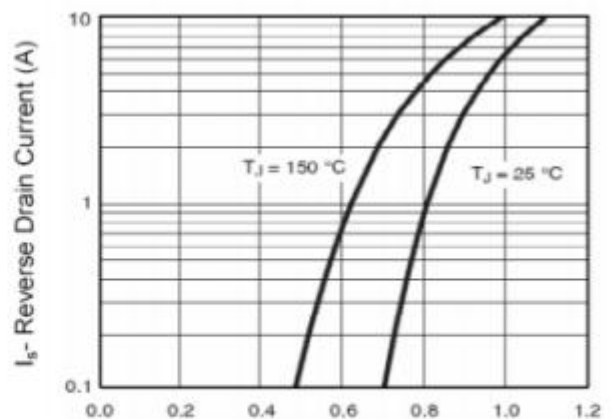
Vgs Gate-Source Voltage (V)
Figure 7 Rdson vs Vgs



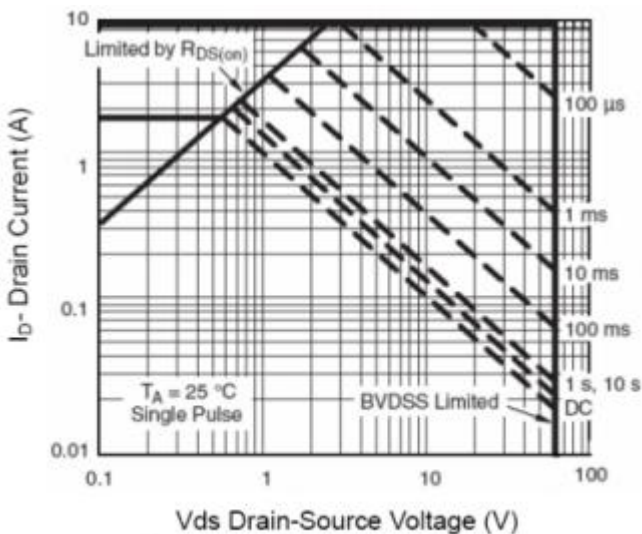
Vds Drain-Source Voltage (V)
Figure 8 Capacitance vs Vds



Qg Gate Charge (nC)
Figure 9 Gate Charge



Vsd Source-Drain Voltage (V)
Figure 10 Source-Drain Diode Forward



Vds Drain-Source Voltage (V)
Figure 11 Safe Operation Area

5 Typical characteristics diagrams(continues)

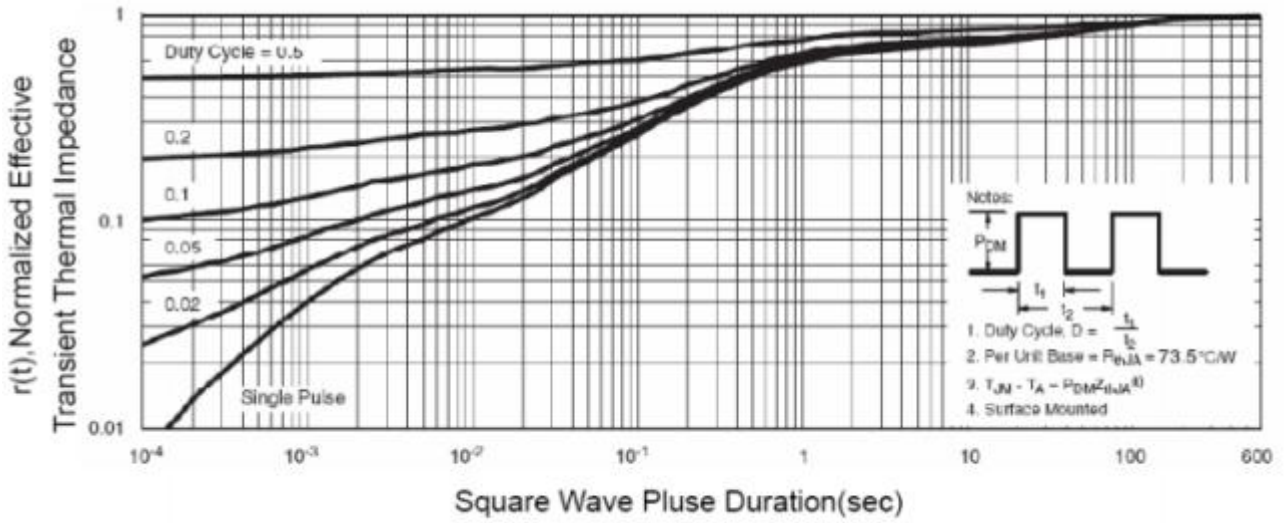
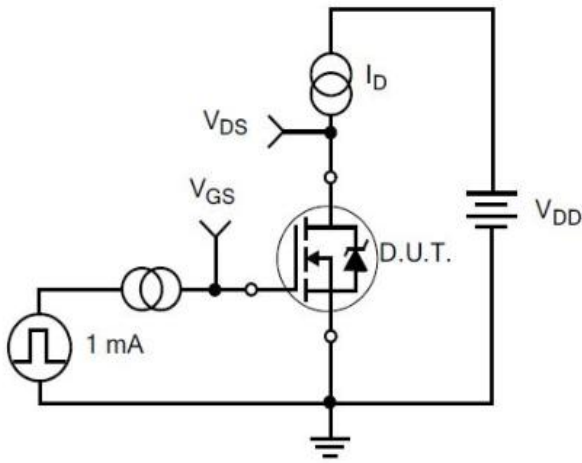
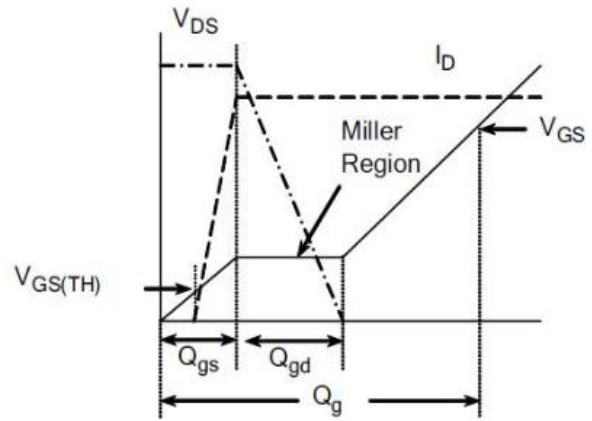


Figure 12 Normalized Maximum Transient Thermal Impedance

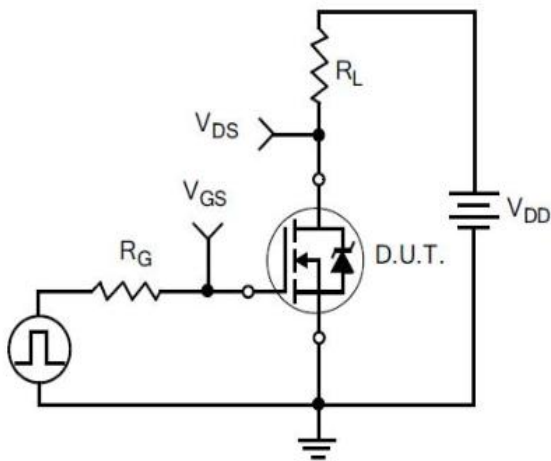
6 Typical Test Circuit and Waveform



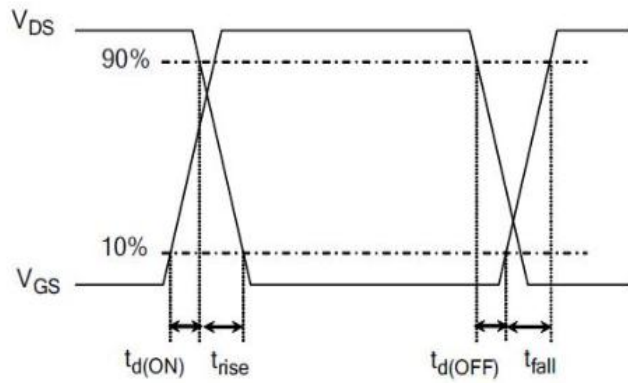
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

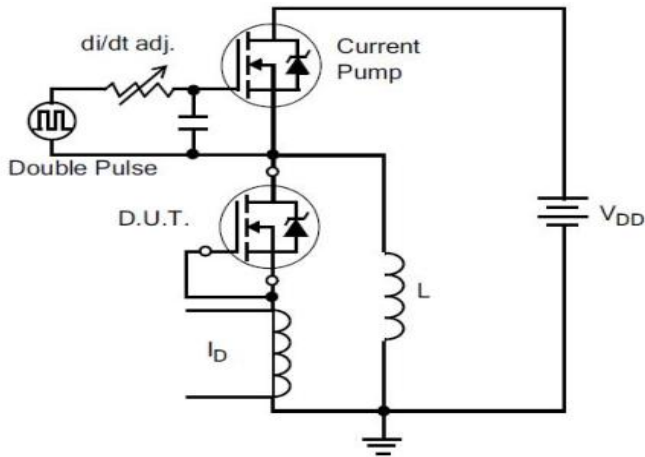


3) Resistive Switching Test Circuit

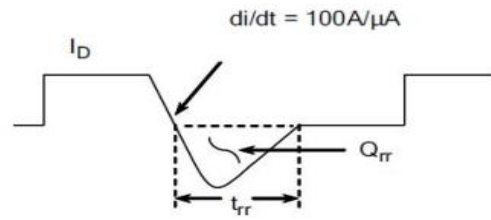


4) Resistive Switching Waveforms

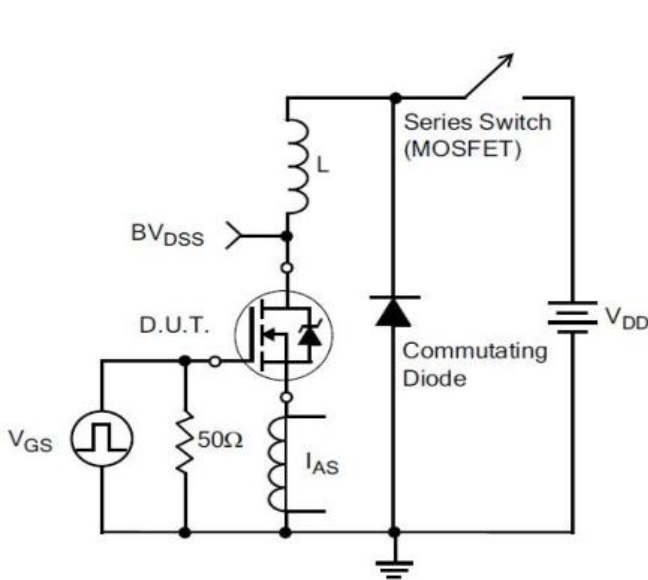
6 Typical Test Circuit and Waveform(continues)



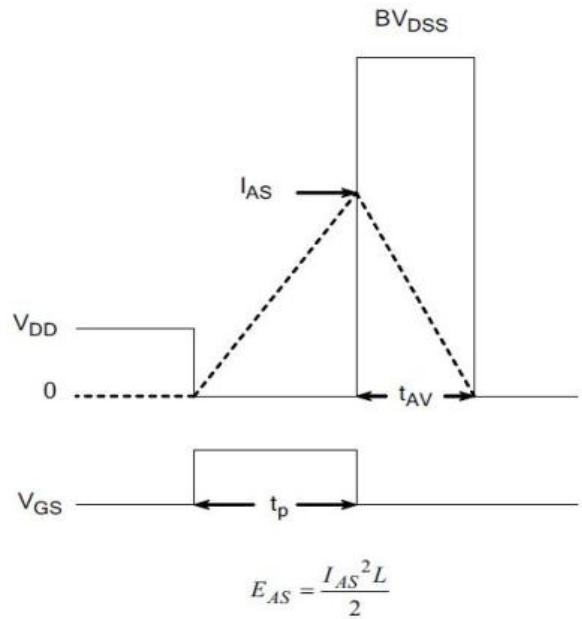
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

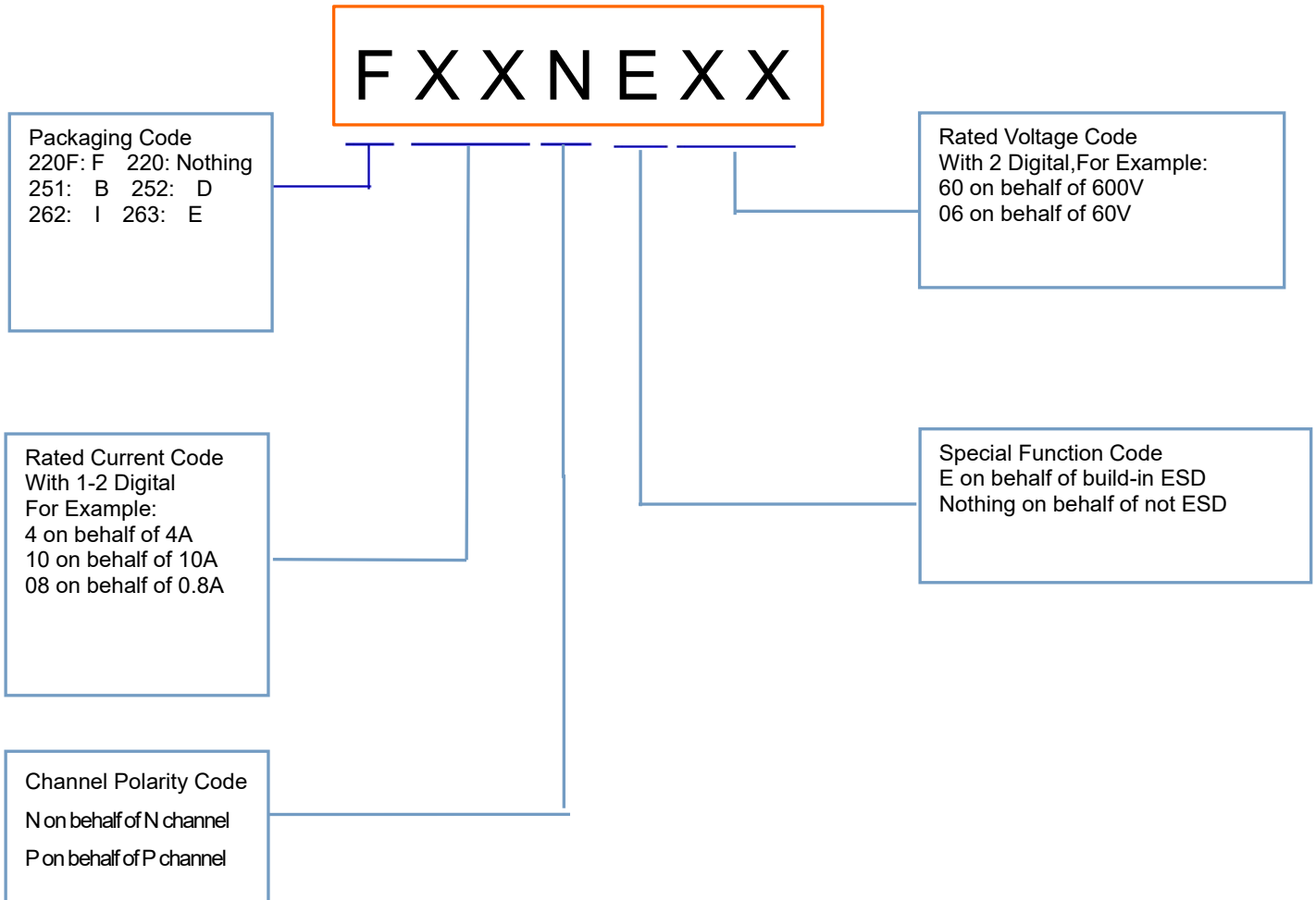


7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

7 Product Names Rules

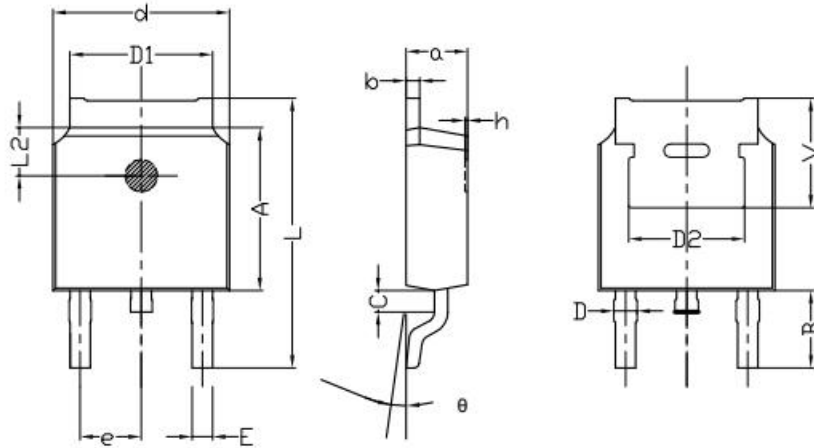


8 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	RoHS	Package	Quantity
D12N06	TO-252	D12N06	Pb-free	Tape & Reel	1000/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
2017.03.09	1.0	Original	