

50A 30V N-channel Enhancement Mode Power MOSFET

1 Description

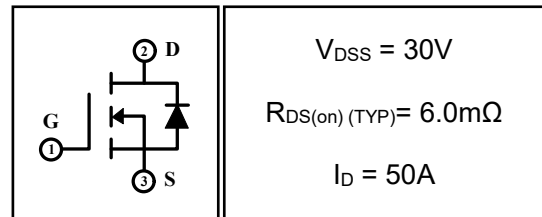
These N-channel enhanced vdmofets used advanced trench technology design, provided excellent $R_{DS(on)}$ and low gate charge. Which accords with the RoHS standard.

2 Features

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

3 Applications

- Power switching applications
- DC-DC converters
- Power tools
- Synchronous Rectifier
- Inverter management system



4 Electrical Characteristics

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

Parameter	Symbol	Value	Units
Maximum Drain-Source DC Voltage	V_{DSS}	30	V
Maximum Gate-Drain Voltage	V_{GSS}	± 20	V
Drain Current(continuous)	I_D	$T_C=25^\circ C$	50
		$T_C=100^\circ C$	35
Drain Current(Pulsed) ⁽¹⁾	I_{DM}	140	A
Single Pulse Avalanche Energy ⁽⁴⁾	E_{AS}	100	mJ
Avalanche Current ⁽⁴⁾	I_{AS}	20	A
Total Dissipation	P_{tot}	$T_a=25^\circ C$	1.15
		$T_C=25^\circ C$	60
Junction Temperature	T_j	-55~175	$^\circ C$
storage Temperature	T_{stg}	-55~175	$^\circ C$
Maximum Temperature for soldering	T_L	300	$^\circ C$

4.2 Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance Junction to Case-sink	R_{thJC}	2.5	$^\circ C/W$
Thermal Resistance Junction to Ambient	R_{thJA}	130.4	$^\circ C/W$

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

Parameter	Symbol	Test Condition	Value			Units
			Min	Typ	Max	
Off Characteristics						
Drain-source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	30	33	---	V
Drain-to-Source Leakage Current	I _{DSS}	V _{DS} =30V, V _{GS} =0V, T _C =25°C	---	---	1	μA
		V _{DS} =24V, V _{GS} =0V, T _C =125°C	---	---	100	μA
Gate-to-Source Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
On Characteristics						
Gate threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1	1.5	2	V
Drain-source on-state Resistance	R _{DS(on)}	V _{GS} =10V, I _D =25A	4.5	6	7.5	mΩ
		V _{GS} =4.5V, I _D =20A	6	9	12	
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =15V, f=1.0MHz	---	1200	---	pF
Output Capacitance	C _{oss}		---	200	---	
Reverse Transfer Capacitance	C _{rss}		---	137	---	
Gate Resistance	R _G	V _{GS} =0V, V _{DS} =0V, f=1.0MHz	---	1.25	---	Ω
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	I _D =50A, V _{DD} =15V, V _{GS} =4.5V, R _{GEN} =2Ω	---	16	---	nS
Turn-on Rise Time	t _r		---	110	---	
Turn-off Delay Time	t _{d(off)}		---	25	---	
Turn-off Fall Time	t _f		---	110	---	
Total Gate Charge	Q _g	I _D =25A, V _{DD} =15V, V _{GS} =10V	---	25.7	---	nC
Gate-to-Source Charge	Q _{gs}		---	5.2	---	
Gate-to-Drain("Miller") Charge	Q _{gd}		---	5.8	---	
Drain-Source Diode Characteristics						
Diode Forward Voltage ⁽³⁾	V _{FSD}	V _{GS} =0V, I _S =30A	---	0.9	1.3	V
Diode Forward Current	I _S		---	---	50	A
Reverse Recovery Time ⁽³⁾	t _{rr}	T _J =25°C, I _F =25A, dI _F /dt=100A/μS, V _{GS} =0V	---	11	---	nS
Reverse Recovery Charge ⁽³⁾	Q _{rr}		---	3.4	---	nC

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%.
4. EAS condition : L=0.5mH, I_D=14A, V_{DD}=24V, V_{GATE}=30V, Start T_J=25°C.

5 Typical characteristics diagrams

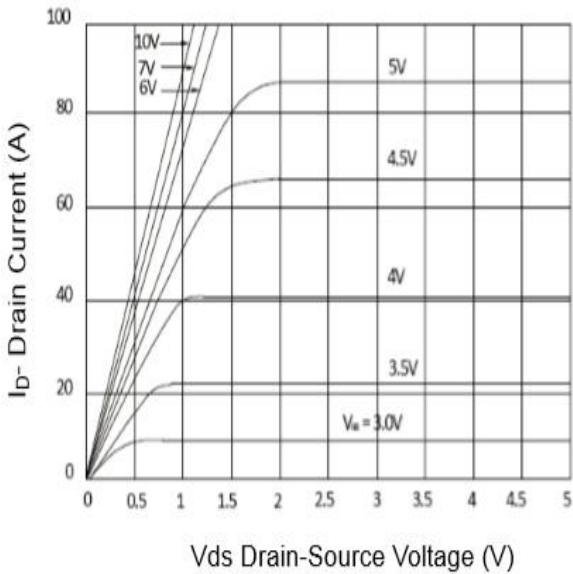


Figure 1 Output Characteristics

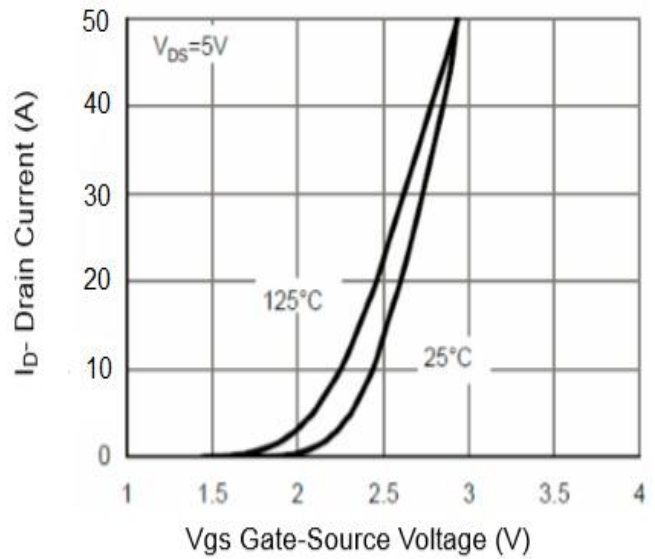


Figure 2 Transfer Characteristics

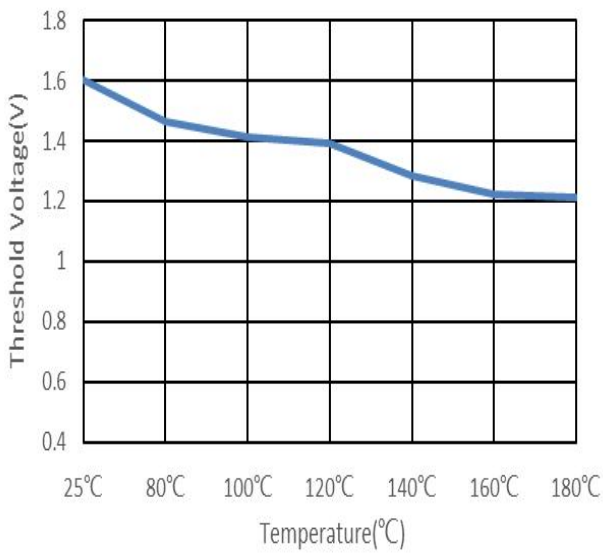


Figure 3. Threshold vs Temperature

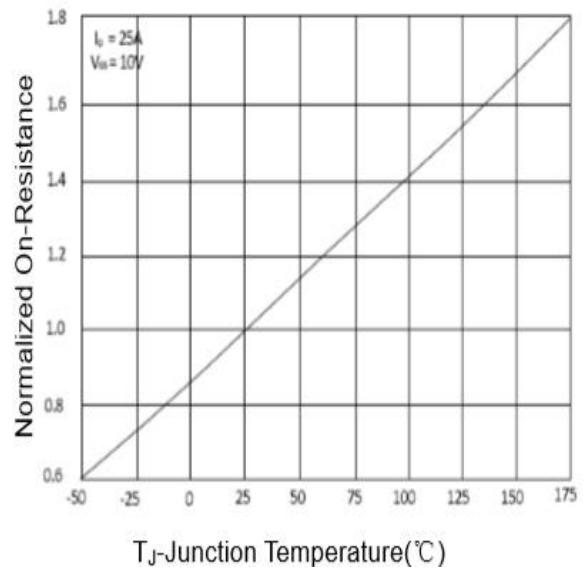


Figure 4. Rdson vs Temperature

5 Typical characteristics diagrams(continues)

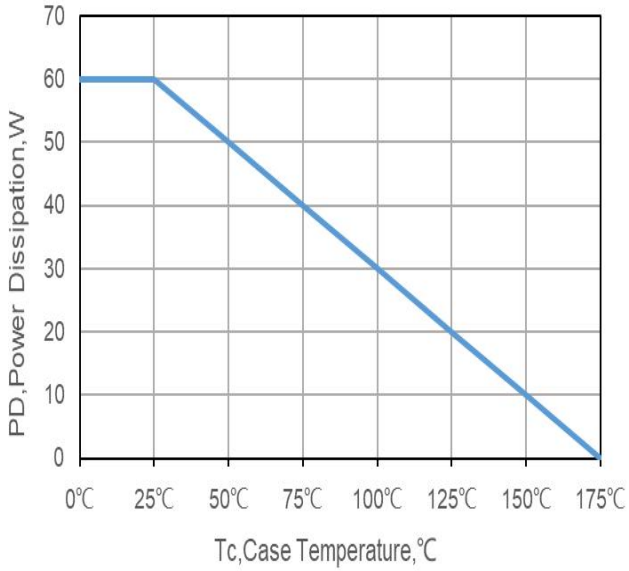


Figure 5. Power De-rating

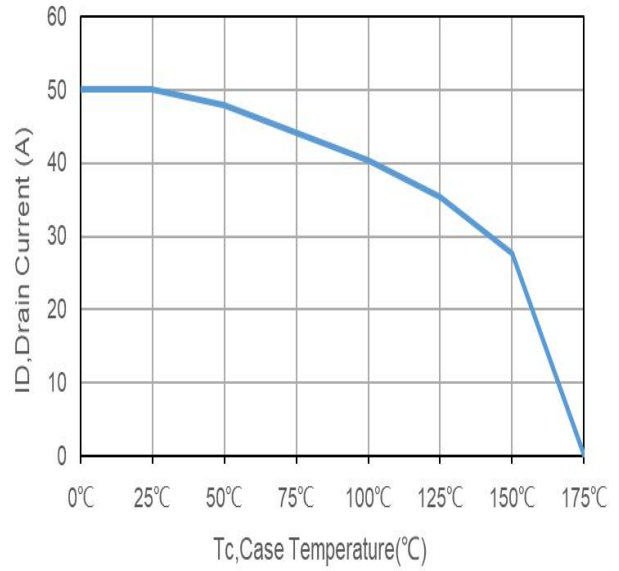


Figure 6. ID Current Derating

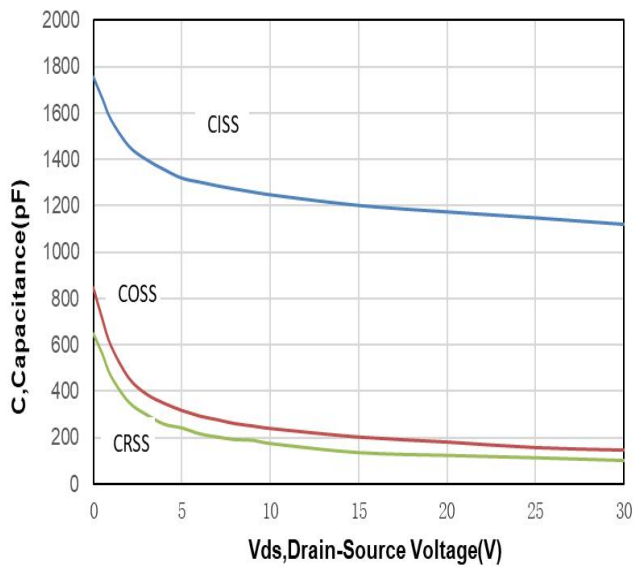


Figure 7. Capacitance Characteristics

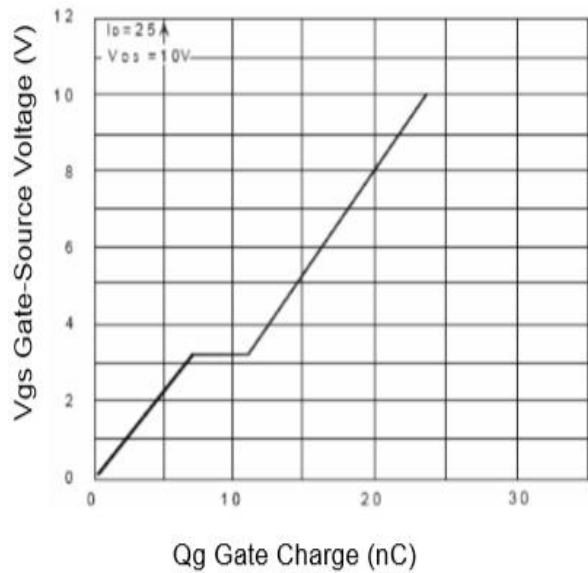


Figure 8. Gate Charge Characteristics

5 Typical characteristics diagrams(continues)

Safe Operating Area

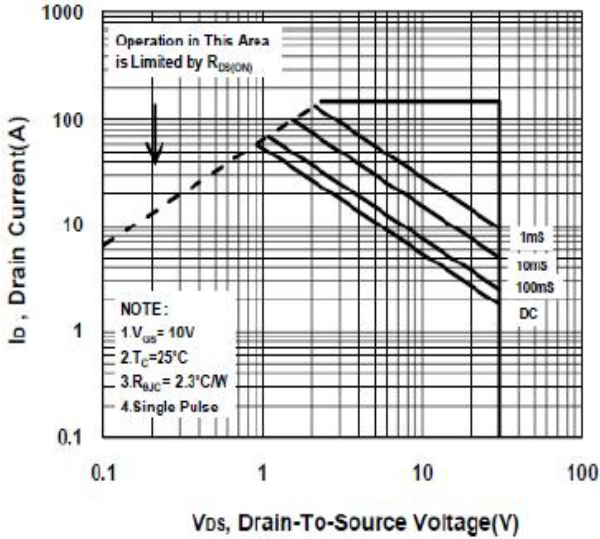


Figure 9. Safe Operation Area

Single Pulse Maximum Power Dissipation

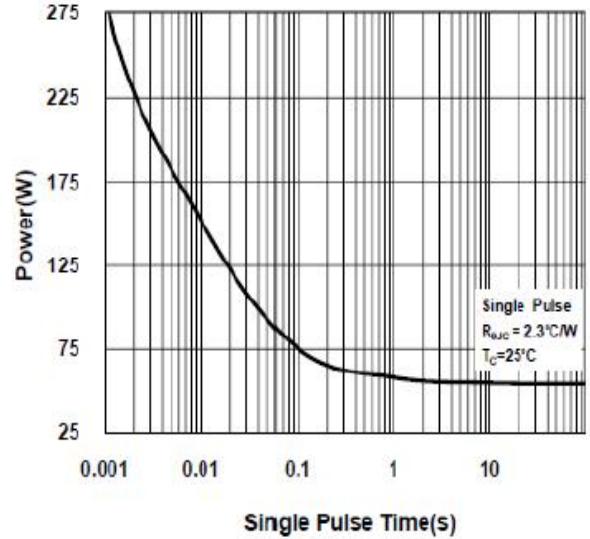


Figure 10. Single Pulse Maximum Power Dissipation

Transient Thermal Response Curve

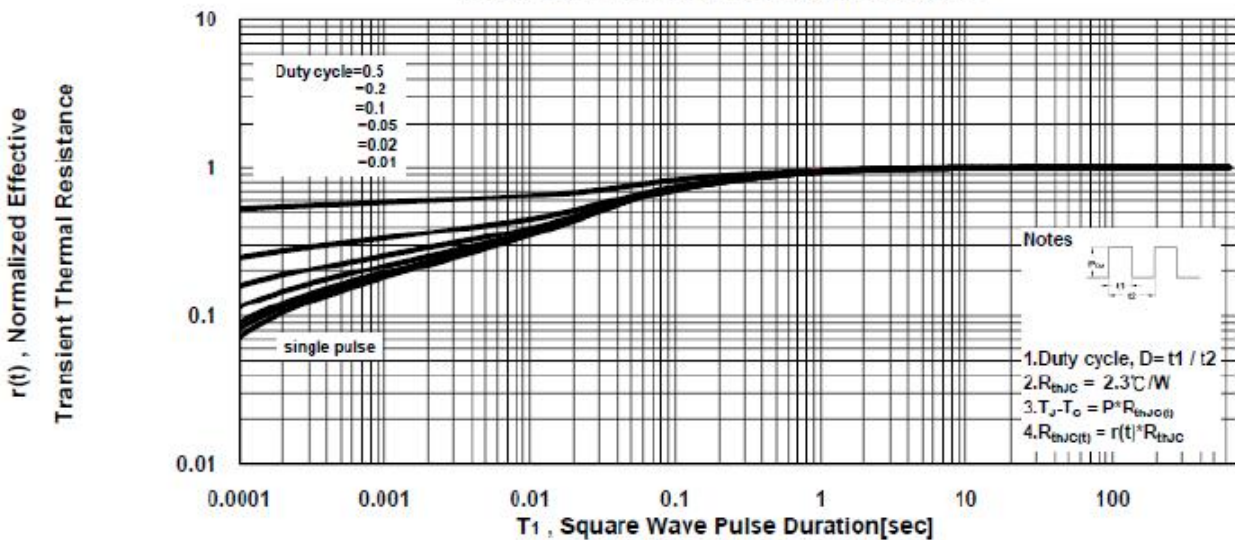
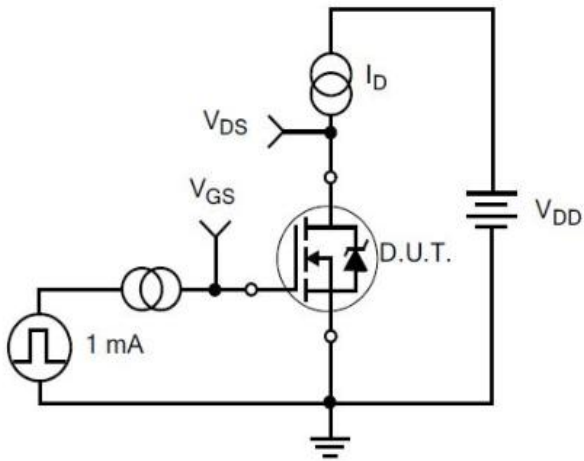
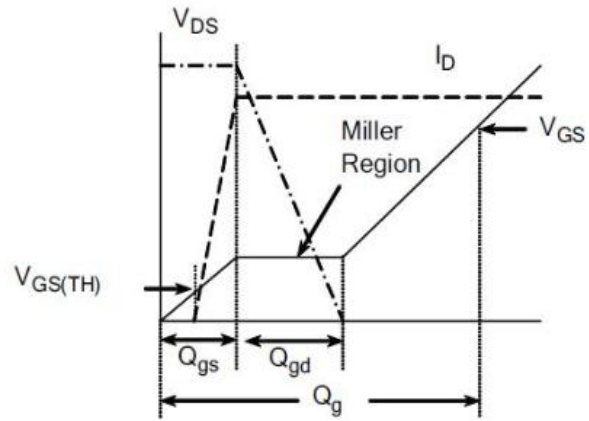


Figure 11. Transient Thermal Response Curve

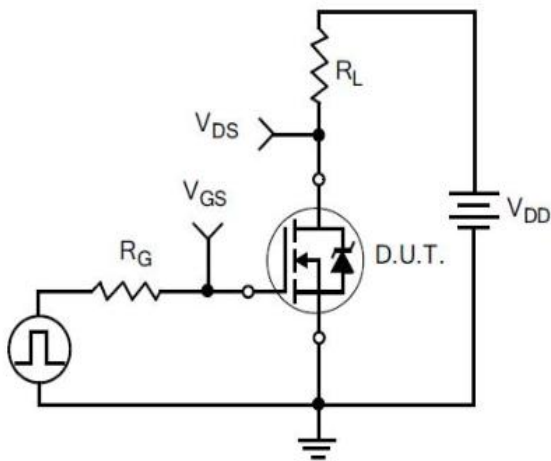
6 Typical Test Circuit and Waveform



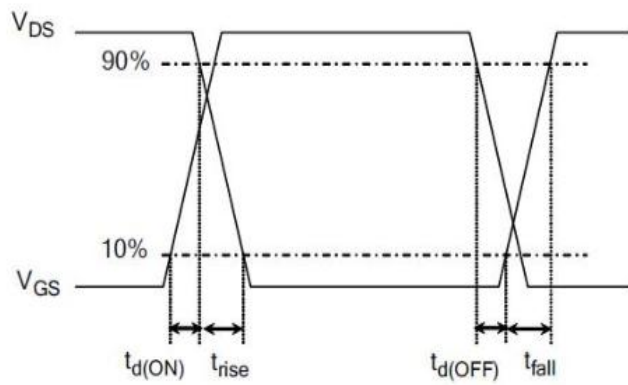
1) Gate Charge Test Circuit



2) Gate Charge Waveform

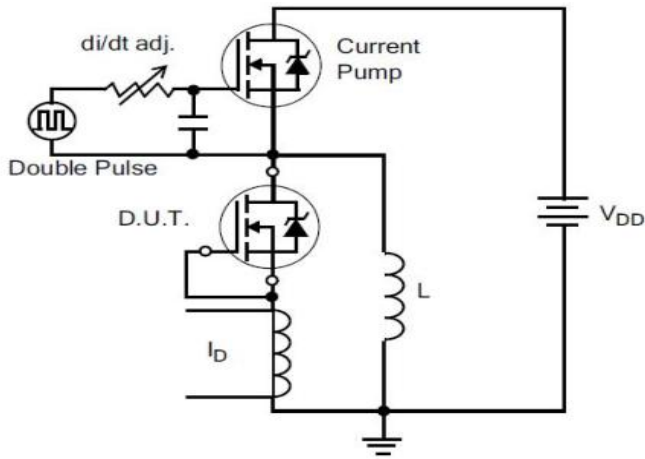


3) Resistive Switching Test Circuit

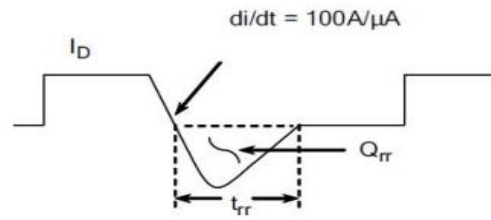


4) Resistive Switching Waveforms

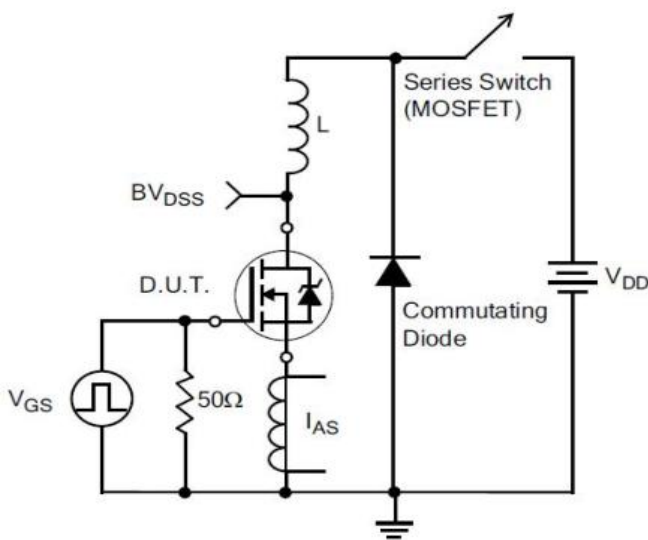
6 Typical Test Circuit and Waveform(continues)



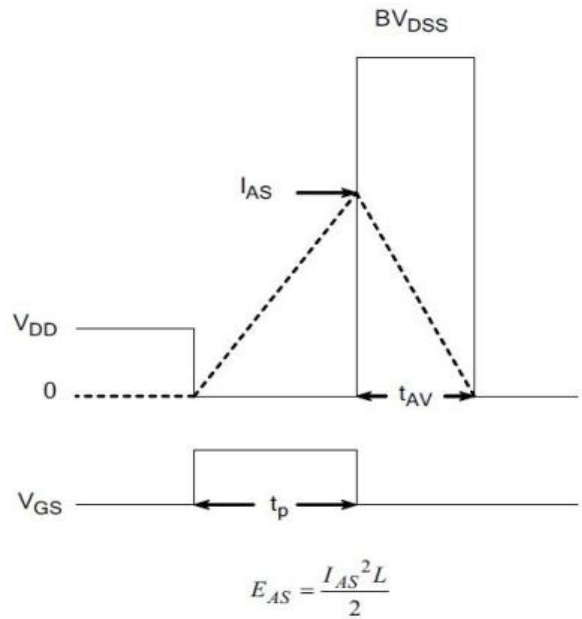
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

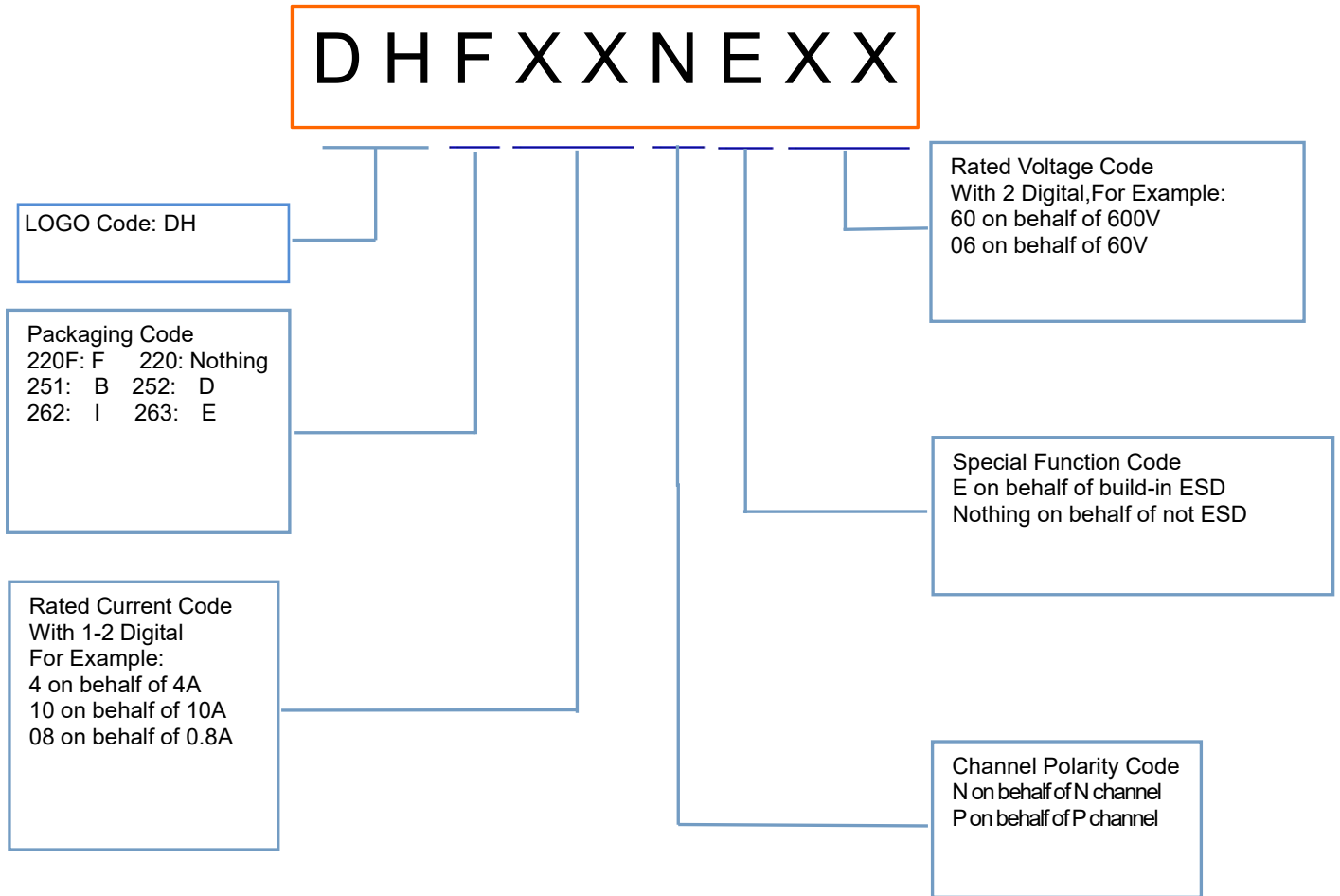


7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

7 Product Names Rules

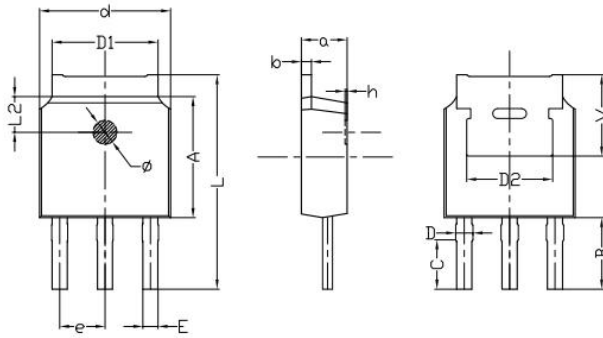


8 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	RoHS	Package	Quantity
DHB50N03	TO-251	DHB50N03	Pb-free	Tube	3000/box
DHD50N03	TO-252	DHD50N03	Pb-free	Tape & Reel	2500/box

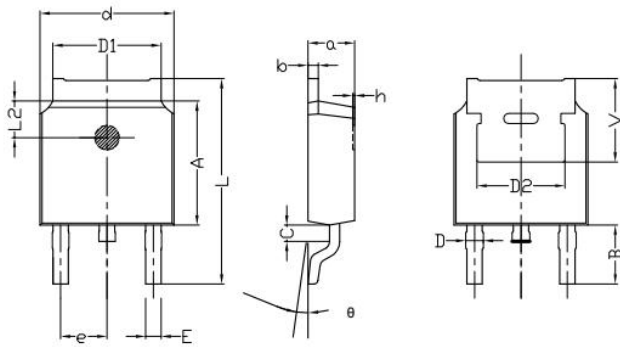
9 Dimensions

TO-251B PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
a	2.20	2.40	0.087	0.0946
b	0.46	0.58	0.018	0.023
C	2.45	2.65	0.097	0.104
D	0.80	0.90	0.032	0.035
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	10.40	11.00	0.4098	0.4334
B	3.50	3.70	0.1379	0.1458
L2	1.5	1.8	0.059	0.071
Φ	1.10	1.30	0.0433	0.0512
h	0.00	0.30	0.000	0.012
V	5.25	5.85	0.207	0.230
E	0.60	0.80	0.0236	0.0315

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
2020.04.15	1.0	Original	