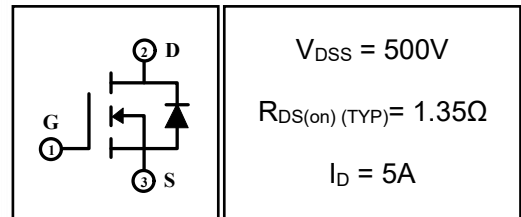


5A 500V N-channel Enhancement Mode Power MOSFET

1 Description

830, the silicon N-channel enhanced vdmofets, 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.



2 Features

- Fast switching
- ESD improved capability
- Low gate charge(Typ: 14.5nC)
- Low reverse transfer capacitances(Typ: 7.5pF)
- 100% single pulse avalanche energy test
- 100% ΔV_{DS} test

3 Applications

- Used in various power switching circuit for system miniaturization and higher efficiency.
- Power switch circuit of adaptor and charger.



4 Electrical Characteristics

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

Parameter		Symbol	Rating		Units
			830WB/I830WB/E830WB/B830WB/D830WB	F830WB	
Drain-to-Source Voltage		V_{DSS}	500		V
Gate-to-Source Voltage		V_{GSS}	± 30		V
Continuous Drain Current	$T_C=25^\circ C$	I_D	5		A
	$T_C=100^\circ C$		3		A
Pulsed Drain Current ⁽¹⁾		I_{DM}	20		A
Single Pulse Avalanche Energy ⁽⁴⁾		E_{AS}	280		mJ
Peak Diode Recovery dv/dt ⁽⁵⁾		dv/dt	5		V/ns
Power Dissipation	$T_a=25^\circ C$	P_{tot}	2.0	2.0	W
	$T_C=25^\circ C$	P_{tot}	74	48	W
Isolation Voltage		V_{ISO}	/	2500	V
Junction Temperature Range		T_J	$-55 \sim 150$		$^\circ C$
Storage Temperature Range		T_{stg}	$-55 \sim 150$		$^\circ C$
Maximum Temperature for soldering		T_L	300		$^\circ C$

4.2 Thermal Characteristics

Parameter	Symbol	Rating		Unit
		830WB/I830WB/E830WB/B830WB/D830WB	F830WB	
Thermal Resistance, Junction to Case-sink	R_{thJC}	1.69	2.6	$^\circ C/W$
Thermal Resistance, Junction to Ambient	R_{thJA}	62.5	62.5	$^\circ C/W$

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	500	--	--	V
Drain-to-Source Leakage Current	I _{DSS}	V _{DS} =500V,V _{GS} =0V,T _C =25℃	--	--	1	μA
		V _{DS} =400V,V _{GS} =0V,T _C =125℃	--	--	100	μA
Gate-to-Source Leakage Current	I _{GSS}	V _{GS} =±30V	--	--	±10	μA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	2.0	--	4.0	V
Drain-to-Source on-state Resistance	R _{DS(on)}	V _{GS} =10V,I _D =2.5A	--	1.35	1.5	Ω
Forward Transfer Conductance	g _{fs}	V _{DS} =15V,I _D =2.5A	2.4	--	--	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{GS} =0V,V _{DS} =25V,f=1.0MHz	--	560	--	pF
Output Capacitance	C _{oss}		--	45	--	
Reverse Transfer Capacitance	C _{rss}		--	17	--	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	I _D =5A, V _{DD} =250V, R _G =25Ω	--	14	--	nS
Turn-on Rise Time	t _r		--	18	--	
Turn-off Delay Time	t _{d(off)}		--	30	--	
Turn-off Fall Time	t _f		--	11	--	
Total Gate Charge	Q _g	I _D =5A,V _{DD} =400V,V _{GS} =10V	--	12.8	--	nC
Gate-to-Source Charge	Q _{gs}		--	3.2	--	
Gate-to-Drain(“Miller”) Charge	Q _{gd}		--	4.8	--	
Drain-Source Diode Characteristics						
Diode Forward Voltage ⁽³⁾	V _{FSD}	V _{GS} =0V,I _S =5A	--	--	1.4	V
Diode Forward Current	I _S		--	--	5	A
Reverse Recovery Time ⁽³⁾	t _{rr}	T _J =25℃,I _F =5A, dI _F /dt=100A/μS,V _{GS} =0V	--	320	--	nS
Reverse Recovery Charge ⁽³⁾	Q _{rr}		--	1500	--	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: L=24mH, I_D=5A, V_{DD}=50V, V_{GATE}=500V, Start T_J=25°C.
- 5: I_{SD}=5.0A, di/dt≤100A/μs, V_{DD}≤BV_{DSS}, Start T_J=25°C.

5 Typical characteristics diagrams

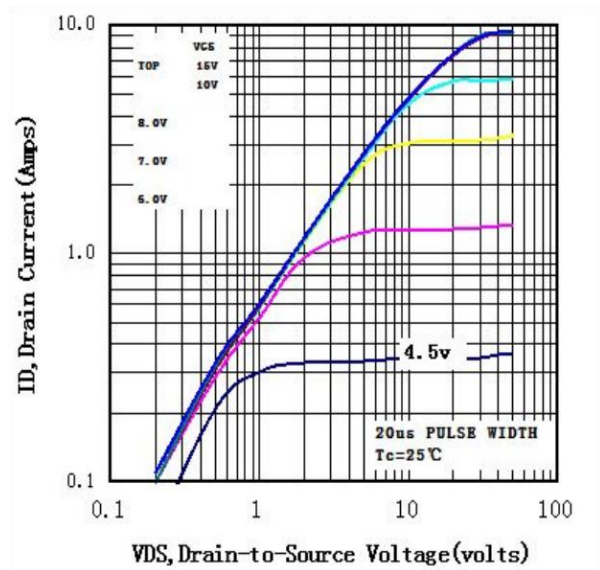


图 1 输出特性曲线, $T_c=25^\circ\text{C}$

Fig1 Typical Output Characteristics, $T_c=25^\circ\text{C}$

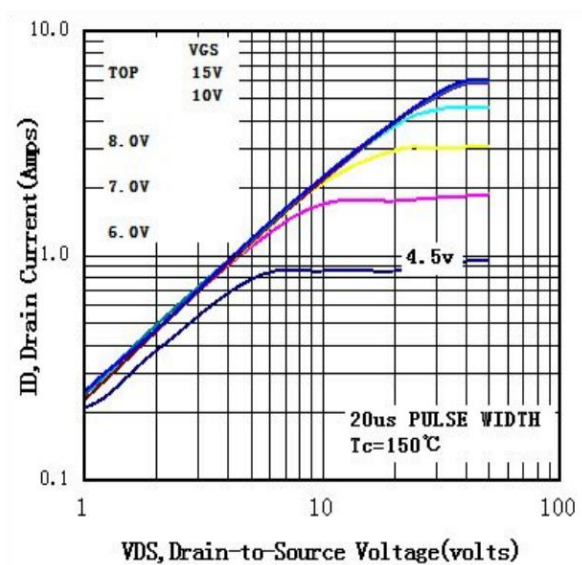


图 2 输出特性曲线, $T_c=150^\circ\text{C}$

Fig2 Typical Output Characteristics, $T_c=150^\circ\text{C}$

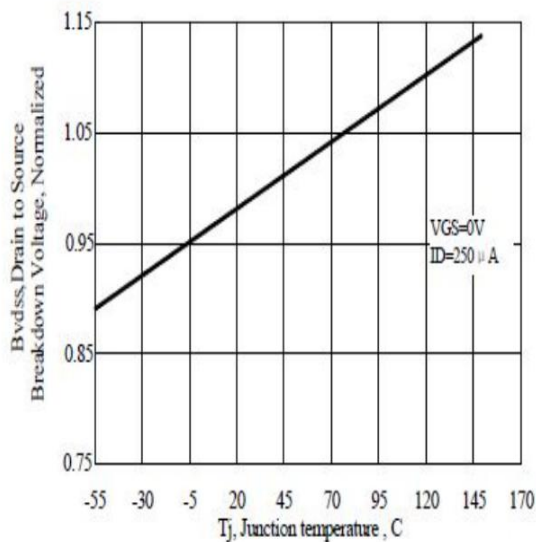


图 3 击穿电压与温度曲线

Fig3 Typical Breakdown Voltage vs Junction Temperature

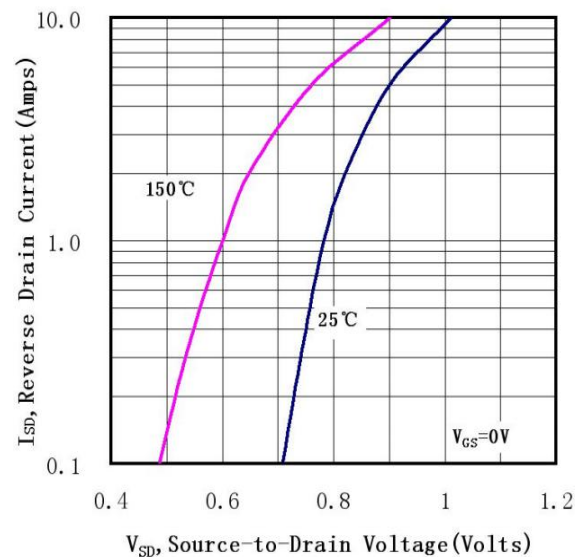


图 4 二极管正向电压曲线

Fig4 Typical Source-Drain Diode Forward Voltage

5 Typical characteristics diagrams(continues)

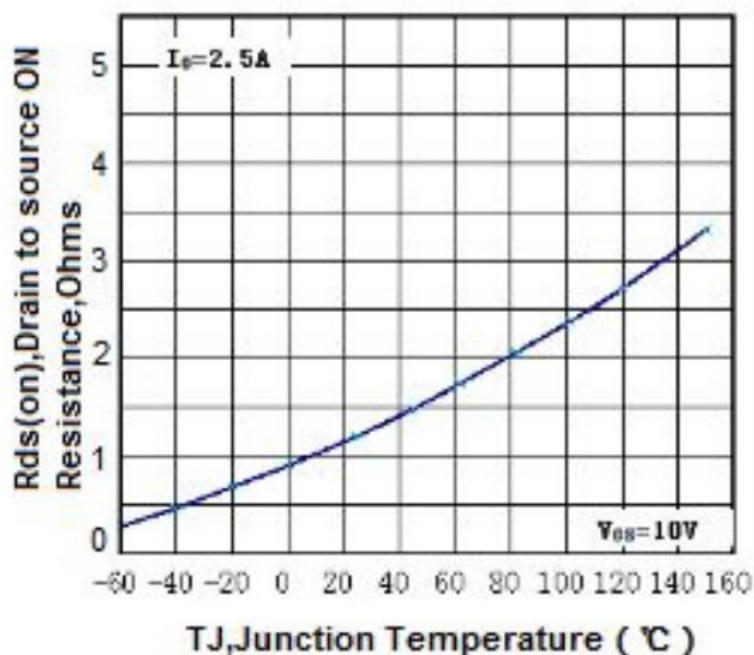


图 5 导通电阻与温度曲线

Fig5 Normalized Resistance Vs. Temperature

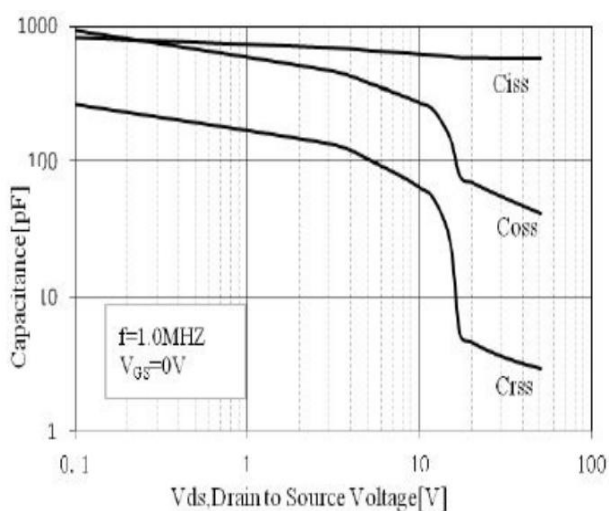


图 6 电容与漏源电压曲线

Fig6 Typical Capacitance vs Drain to Source Voltage

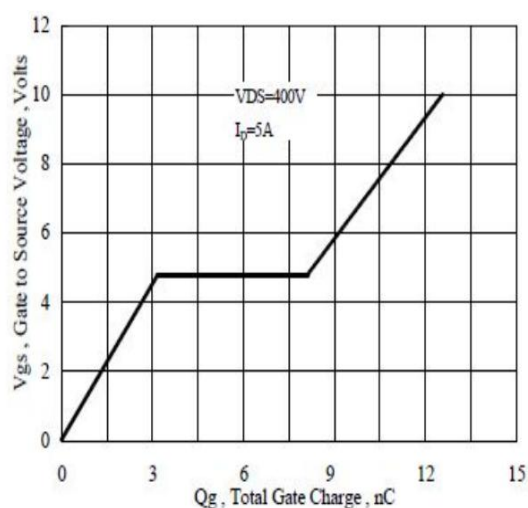


图 7 栅极电荷与栅源电压曲线

Fig7 Typical Gate Charge vs Gate to Source Voltage

5 Typical characteristics diagrams(continues)

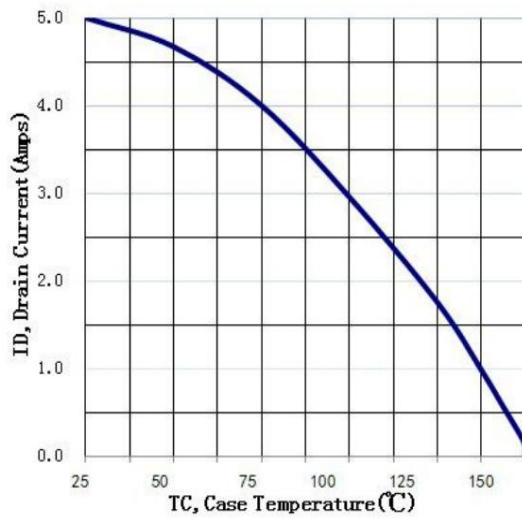


图 8 最大漏极电流与壳温曲线
Fig8 Maximum Drain Current Vs.Case Temperature

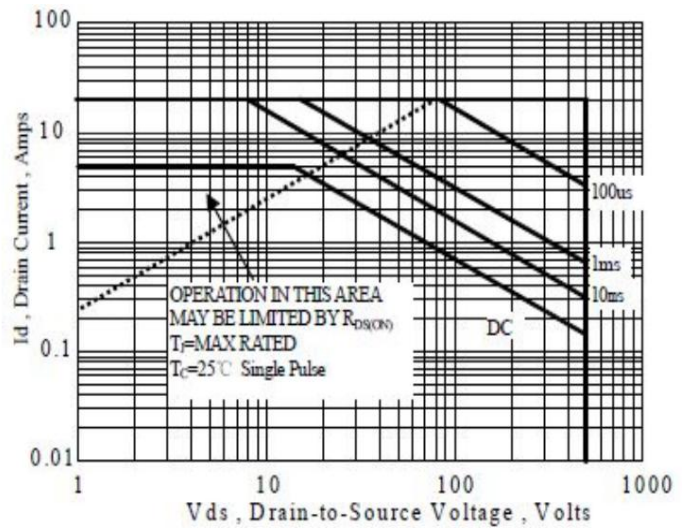
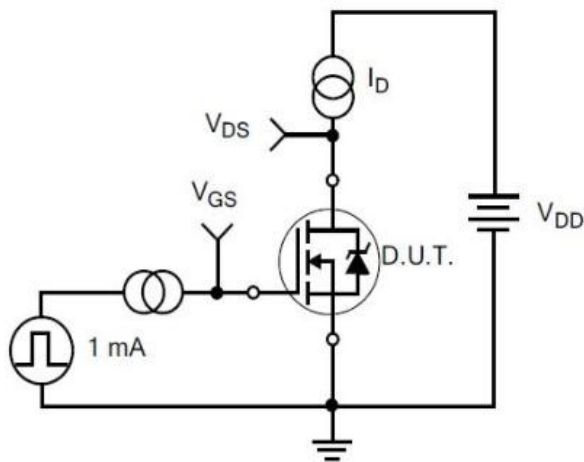
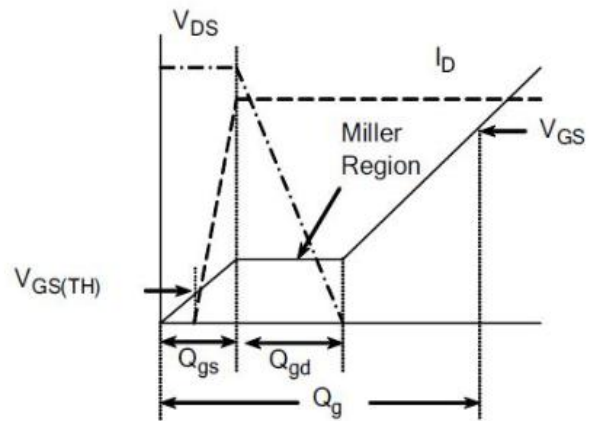


图 9 最大安全工作区曲线
Fig9 Maximum Safe Operating Area

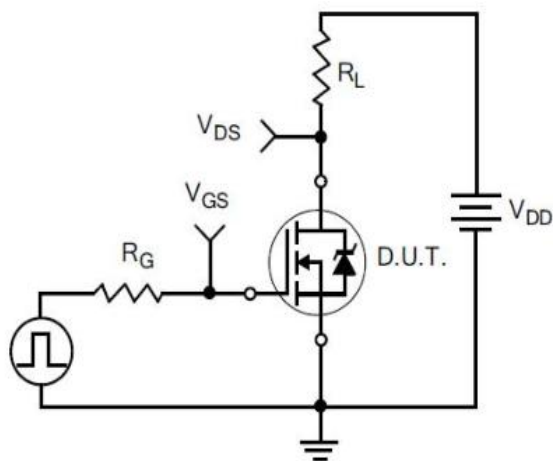
6 Typical Test Circuit and Waveform



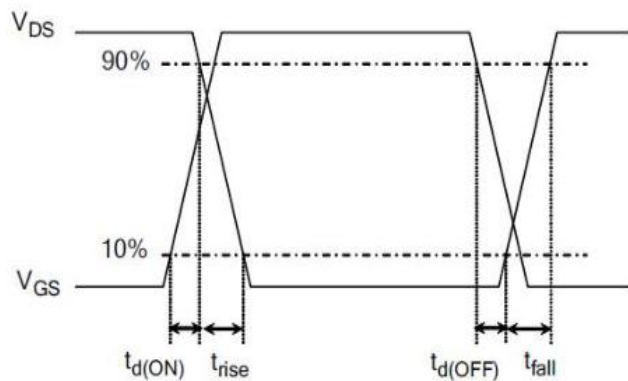
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

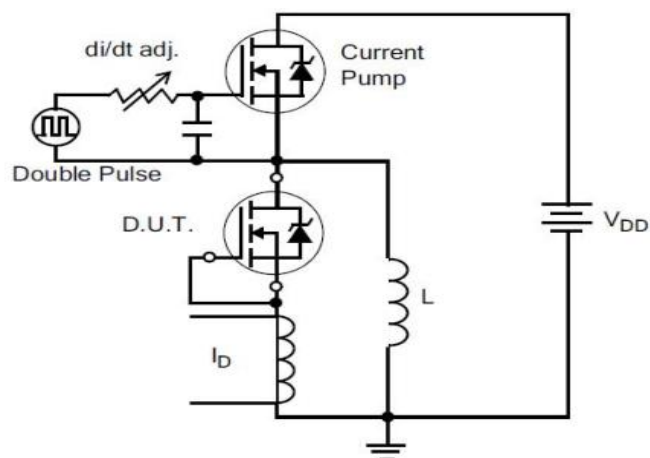


3) Resistive Switching Test Circuit

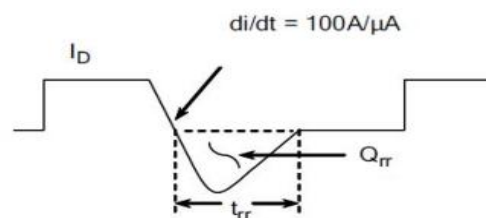


4) Resistive Switching Waveforms

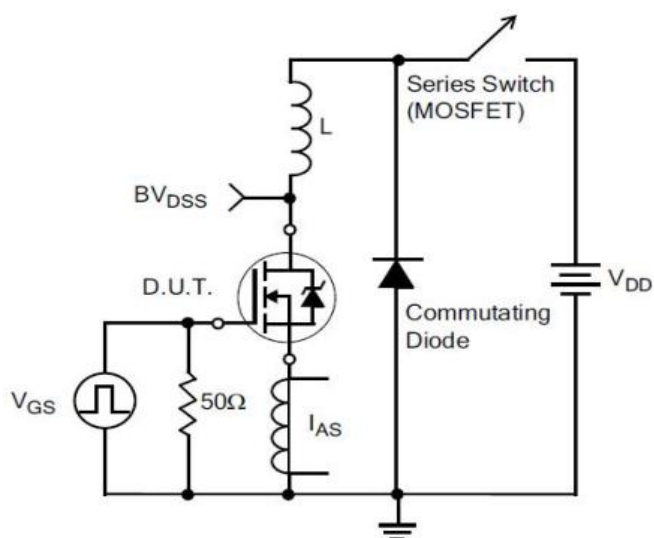
6 Typical Test Circuit and Waveform(continues)



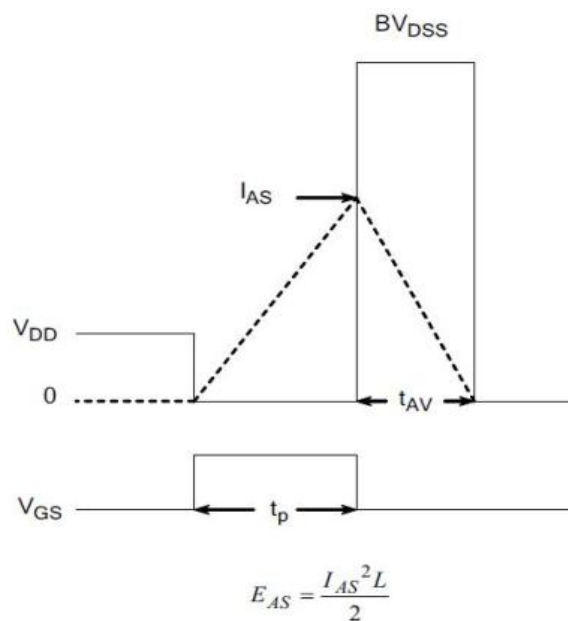
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

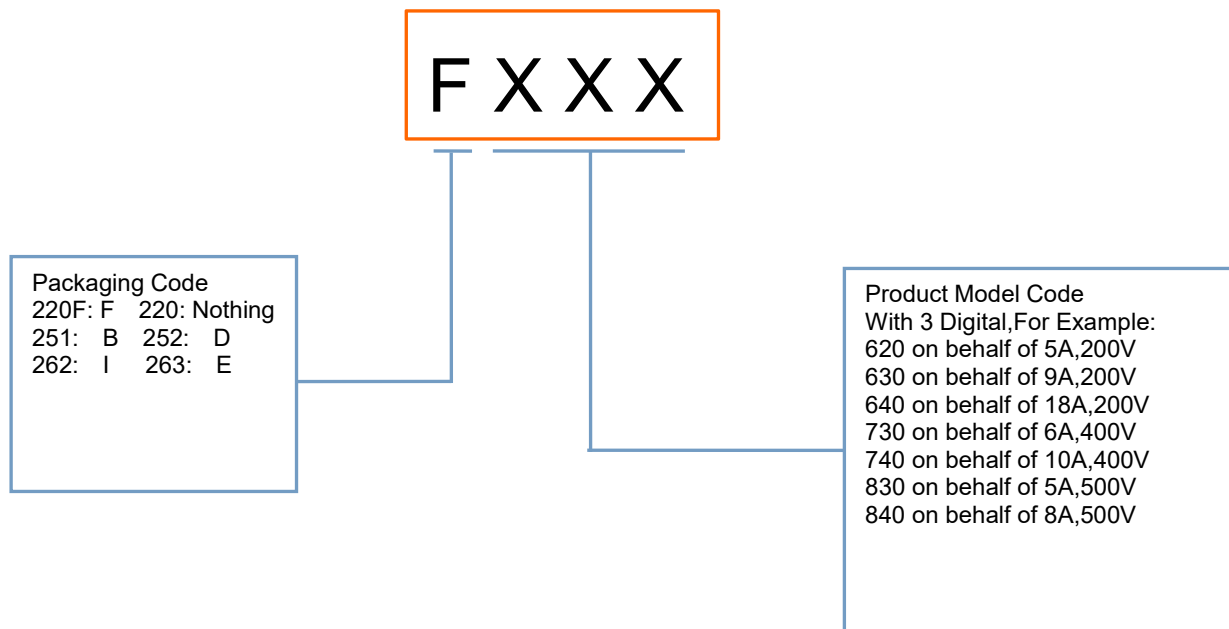


7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

7 Product Names Rules

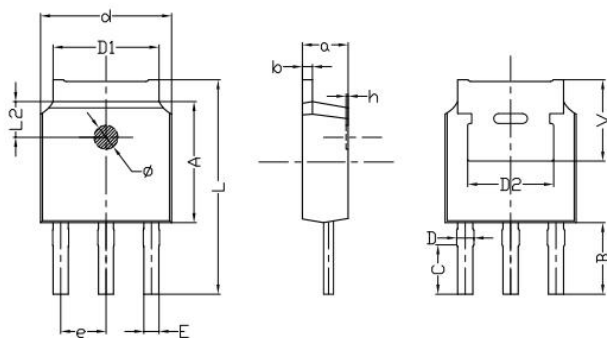


8 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	Indentification Code	RoHS	Package	Quantity
830WB	TO-220	830	WB	Pb-free	Tube	1000/box
F830WB	TO-220F	F830	WB	Pb-free	Tube	1000/box
B830WB	TO-251	B830	WB	Pb-free	Tube	3000/box
D830WB	TO-252	D830	WB	Pb-free	Tape & Reel	2500/box
I830WB	TO-262	I830	WB	Pb-free	Tube	1000/box
E830WB	TO-263	E830	WB	Pb-free	Tape & Reel	800/box

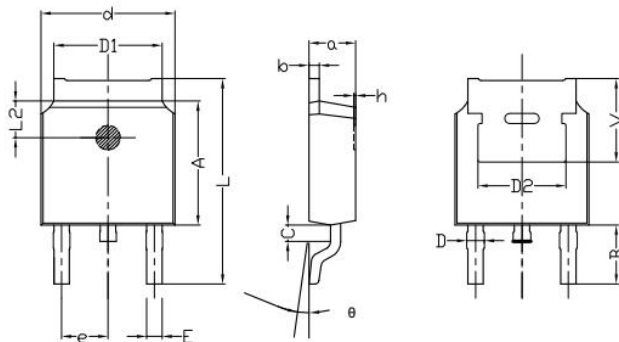
9 Dimensions

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

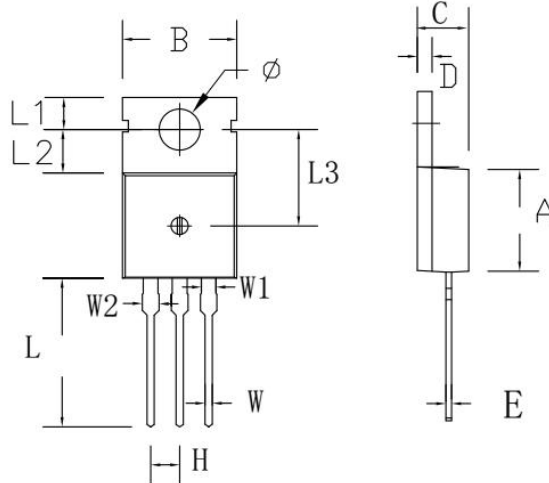
TO-252B PACKAGE OUTLINE DIMENSIONS



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

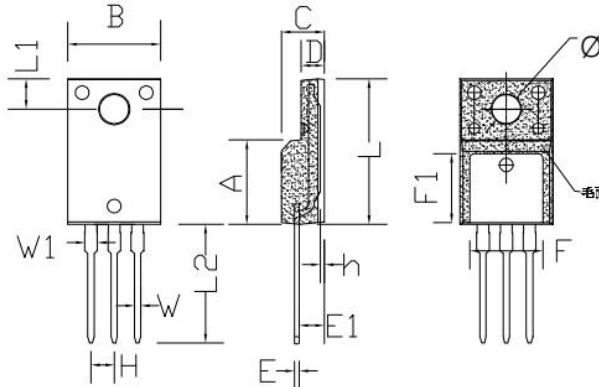
9 Dimensions(continues)

TO-220C PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	8.80	9.30	0.346	0.366
B	9.70	10.30	0.382	0.406
C	4.25	4.75	0.167	0.187
D	1.20	1.45	0.047	0.057
E	0.40	0.60	0.016	0.024
H	2.54 TYP		0.100 TYP	
W	0.60	0.95	0.024	0.037
W1	1.05	1.45	0.041	0.057
W2	1.20	1.60	0.047	0.063
L	12.60	13.40	0.496	0.528
L1	2.45	2.95	0.096	0.116
L2	3.45	3.95	0.136	0.156
L3	8.15	8.65	0.321	0.341
Φ	3.50	3.90	0.138	0.154

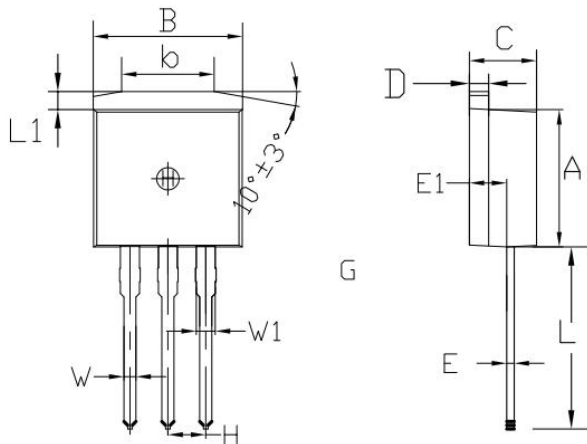
TO-220F PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	8.80	9.30	0.346	0.366
B	10.00	10.50	0.394	0.413
C	4.30	4.90	0.169	0.193
D	2.30	2.70	0.091	0.106
L	15.55	16.15	0.612	0.636
h	0.40	0.60	0.016	0.024
L1	3.15	3.55	0.124	0.140
L2	12.65	13.35	0.498	0.526
W	0.70	0.90	0.028	0.035
W1	1.15	1.55	0.045	0.061
H	2.54 TYP		0.100 TYP	
E	0.48	0.53	0.019	0.021
Φ	2.90	3.40	0.114	0.134
E1	2.40	2.90	0.094	0.114
F	7.75	8.25	0.305	0.325
F1	7.35	7.85	0.289	0.309

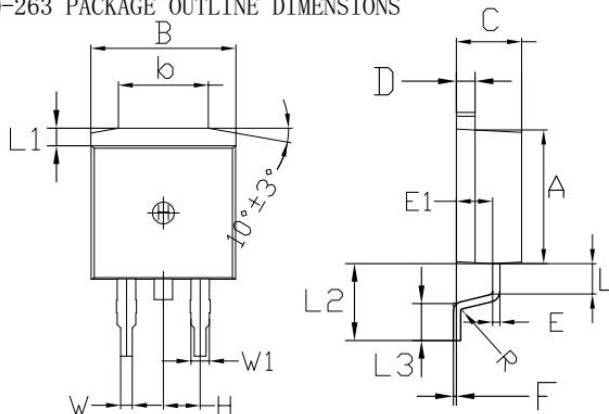
9 Dimensions(continues)

TO-262 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	8.80	9.30	0.346	0.366
B	9.70	10.30	0.382	0.406
C	4.25	4.75	0.167	0.187
D	1.20	1.45	0.047	0.057
E	0.40	0.60	0.016	0.024
L	12.25	13.75	0.482	0.541
L1	1.15	1.45	0.045	0.057
E1	2.4	2.6	0.0945	0.1024
W	0.80	0.82	0.0315	0.034
W1	1.20	1.30	0.047	0.051
H	2.54 TYP		0.200 TYP	
b	5.50	6.50	0.216	0.256

TO-263 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	8.80	9.30	0.346	0.366
B	9.70	10.30	0.382	0.406
C	4.25	4.75	0.167	0.187
D	1.20	1.45	0.047	0.057
E	0.40	0.60	0.016	0.024
L	1.90	2.30	0.075	0.091
L1	1.15	1.45	0.045	0.057
R	0.24	0.26	0.0095	0.0102
W	0.80	0.82	0.0315	0.0323
W1	1.20	1.30	0.047	0.051
H	2.54 TYP		0.200 TYP	
b	5.50	6.50	0.216	0.256
E1	2.4	2.6	0.0946	0.1024
L2	5.20	5.80	0.205	0.228
L3	2.20	3.20	0.087	0.126
F	0.03	0.23	0.0012	0.0091

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
2017.03.14	1.0	Original	