

10.6A 650V N-channel Super Junction Power MOSFET

1 Description

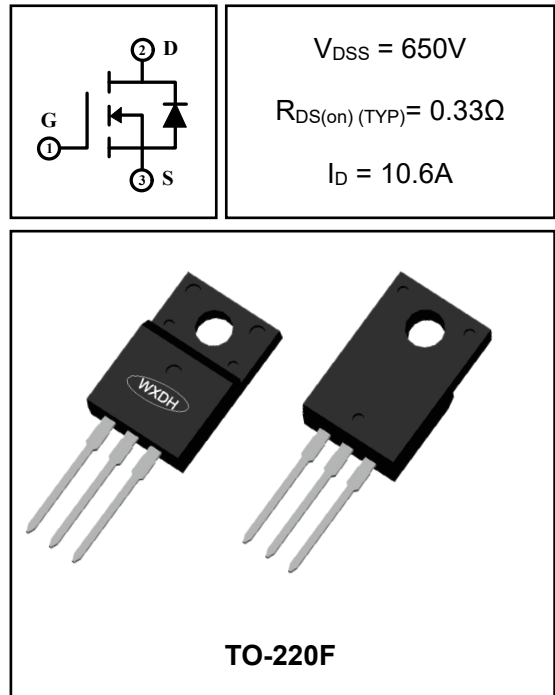
This N-channel enhanced vdmofets, is using advanced super junction technology and design to provide excellent $R_{DS(on)}$ with low gate charge. Which accords with the RoHS standard.

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

- Power factor correction(PFC).
- Switched mode power supplies(SMPS).
- Uninterruptible power supply(UPS).
- TV power & LED Lighting Power
- AC to DC Converters
- Telecom



4 Electrical Characteristics

4.1 Absolute Maximum Rating ($T_c=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Rating	Units
Drain-to-Source Voltage	V_{DS}	650	V
Gate-to-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$T_c=25^\circ\text{C}$	10.6	A
	$T_c=100^\circ\text{C}$	7.6	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	16	A
Single Pulse Avalanche Energy ⁽⁴⁾	E_{AS}	112	mJ
MOSFET dv/dt ruggedness, $V_{DS}=0\dots 400\text{V}$	dv/dt	50	V/ns
Reverse diode dv/dt, $V_{DS}=0\dots 400\text{V}, I_{DS}\leq I_D$	dv/dt	15	V/ns
Power Dissipation	$T_a=25^\circ\text{C}$	P_{tot}	2.8
	$T_c=25^\circ\text{C}$	P_{tot}	36
Isolation Voltage	V_{ISO}	2500	V
Junction Temperature Range	T_j	-55~150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55~150	$^\circ\text{C}$

4.2 Thermal Characteristics

Parameter	Symbol	Rating	Unit
Thermal Resistance, Junction to Case-sink	R_{thJC}	3.48	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient	R_{thJA}	44.1	$^\circ\text{C}/\text{W}$

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	650	--	--	V
Drain-to-Source Leakage Current	I _{DSS}	V _{DS} =650V, V _{GS} =0V, T _C =25°C	--	--	1	μA
		V _{DS} =650V, V _{GS} =0V, T _C =150°C	--	--	100	μA
Gate-to-Source Leakage Current	I _{GSS}	V _{GS} =±20V	--	--	±100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2	3	4	V
Drain-to-Source on-state Resistance	R _{DS(on)}	V _{GS} =10V, I _D =3.4A	--	0.33	0.38	Ω
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =400V, f=1.0MHz	--	860	--	pF
Output Capacitance	C _{oss}		--	24.4	--	
Reverse Transfer Capacitance	C _{rss}		--	3.42	--	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	I _D =4.8A, V _{DD} =325V, V _{GS} =10V, R _G =25Ω	--	15.8	--	nS
Turn-on Rise Time	t _r		--	26.7	--	
Turn-off Delay Time	t _{d(off)}		--	66.4	--	
Turn-off Fall Time	t _f		--	28.7	--	
Total Gate Charge	Q _g	I _D =4.8A, V _{DD} =520V, V _{GS} =10V	--	19.4	--	nC
Gate-to-Source Charge	Q _{gs}		--	5.9	--	
Gate-to-Drain("Miller") Charge	Q _{gd}		--	5.7	--	
Drain-Source Diode Characteristics						
Diode Forward Voltage ⁽³⁾	V _{FSD}	V _{GS} =0V, I _S =4.8A	--	0.83	1.2	V
Diode Forward Current	I _S		--	--	10.6	A
Reverse Recovery Time ⁽³⁾	t _{rr}	T _J =25°C, I _F =4.8A, dI _F /dt=100A/μS, V _{RR} =400V	--	216	--	nS
Reverse Recovery Charge ⁽³⁾	Q _{rr}		--	1800	--	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=4.7A, V_{DD}=50V, V_{GS}=10V, R_G=25Ω, V_{GATE}=650V, Start T_J=25°C.

5 Typical characteristics diagrams

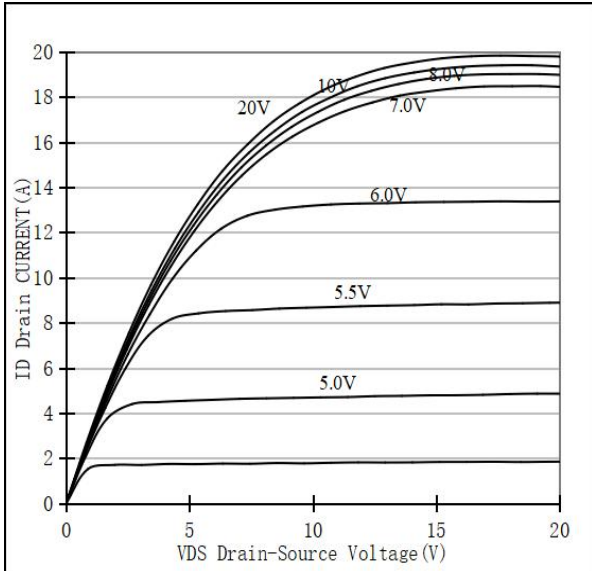


Figure 1 Output Characteristics

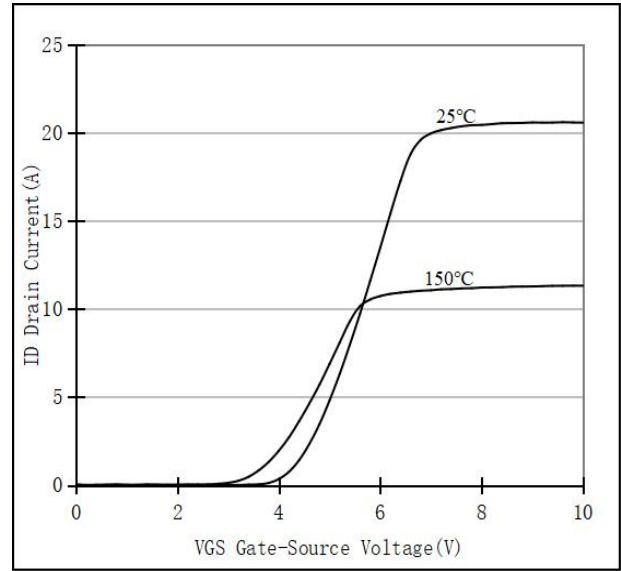


Figure 2 Transfer Characteristics

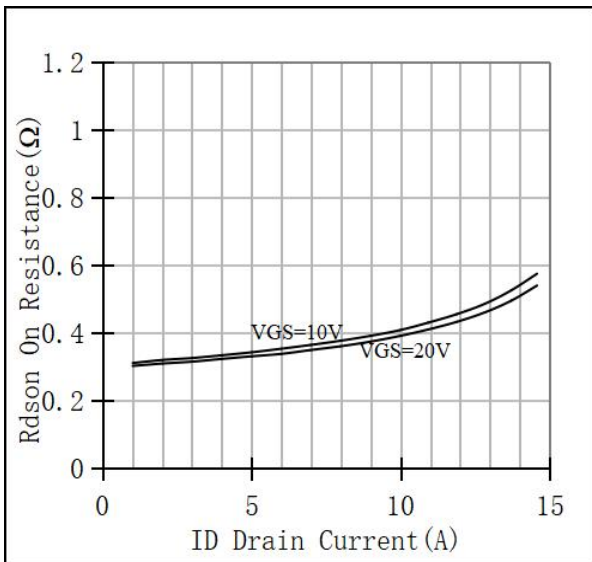


Figure 3 Rdson vs Drain Current

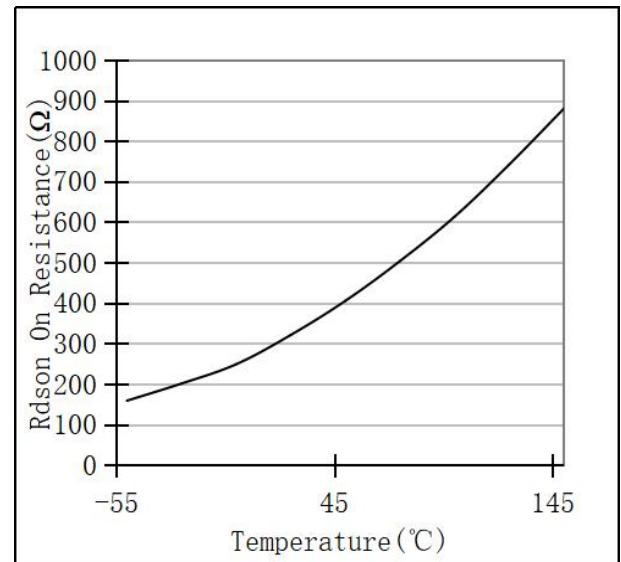


Figure 4 Rdson vs Temperature

5 Typical characteristics diagrams(continues)

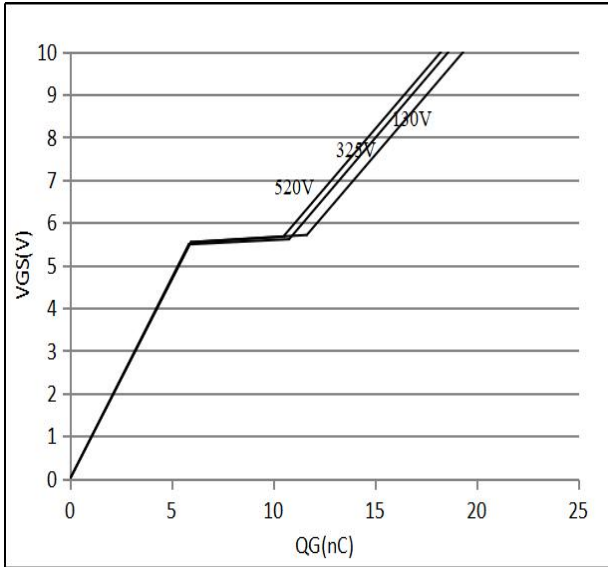


Figure 5 Gate Charge

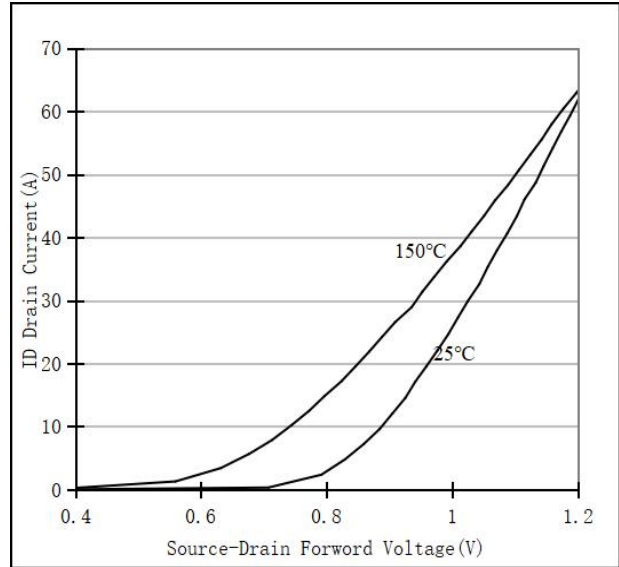


Figure 6 Source vs Drain Diode Forward

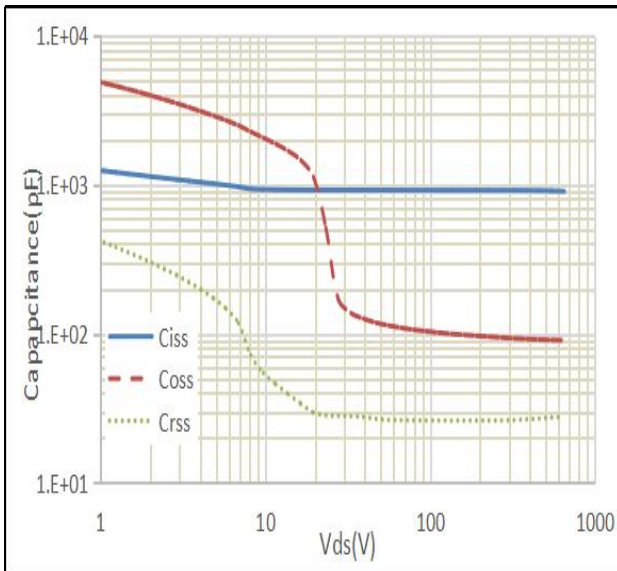


Figure 7 Capacitance vs Vds

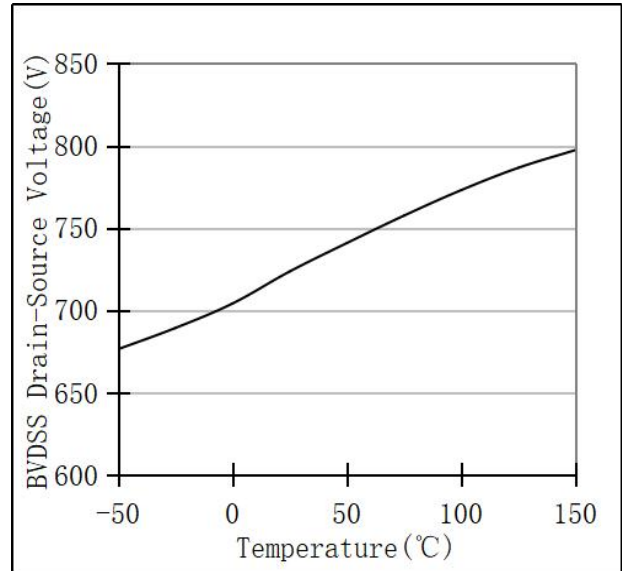


Figure 8 BVDSS vs Temperature

5 Typical characteristics diagrams(continues)

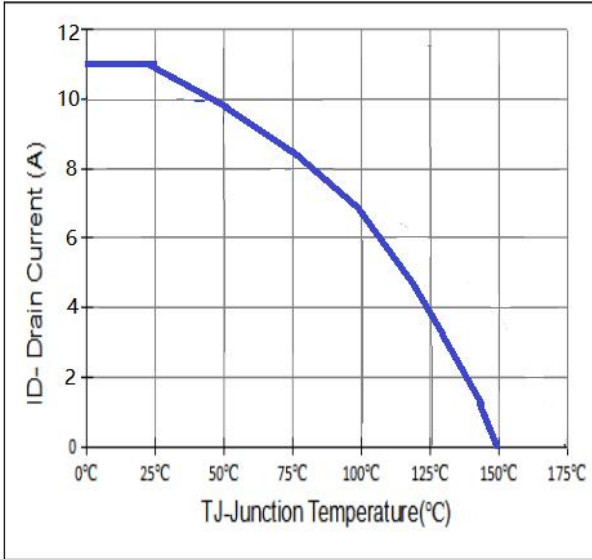


Figure 9. ID Current De-rating

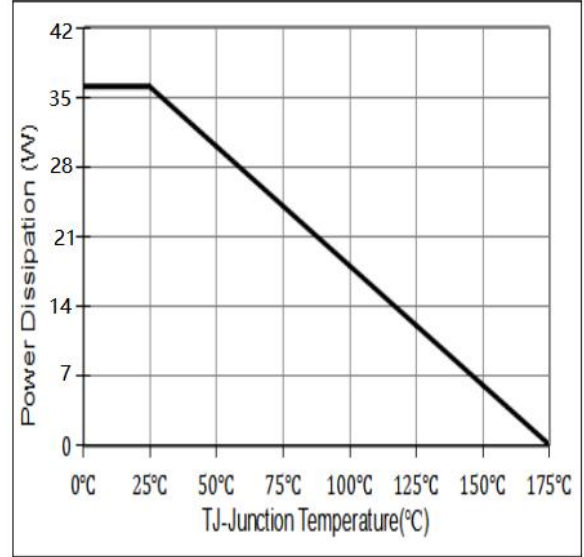


Figure 10. Power De-rating

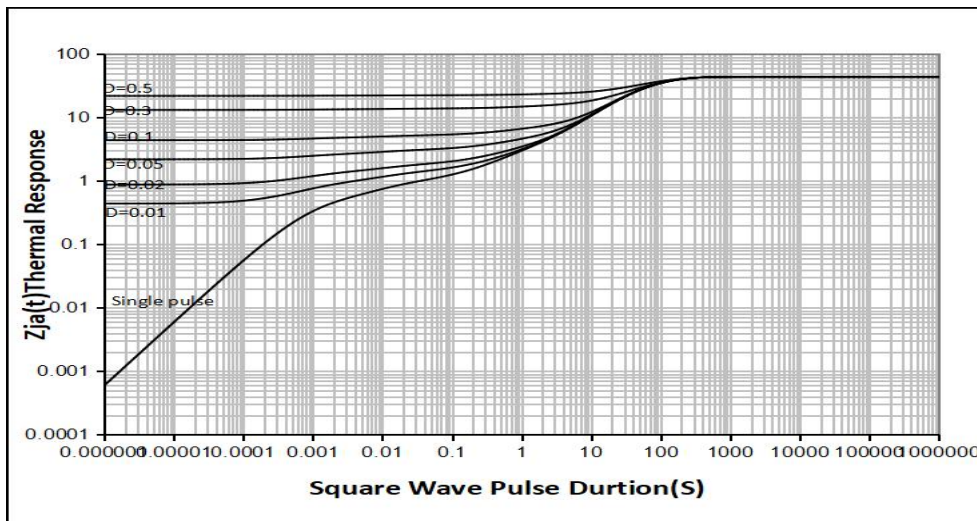
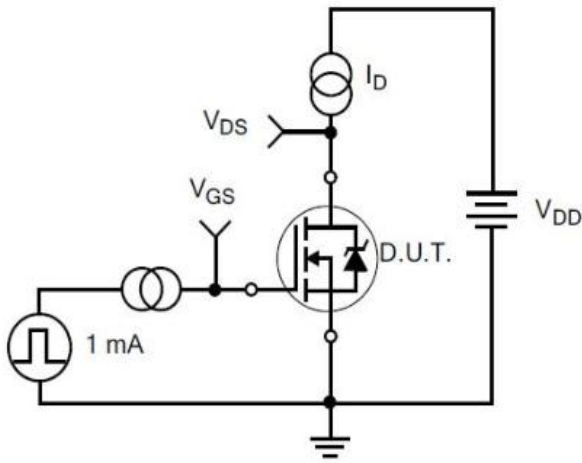
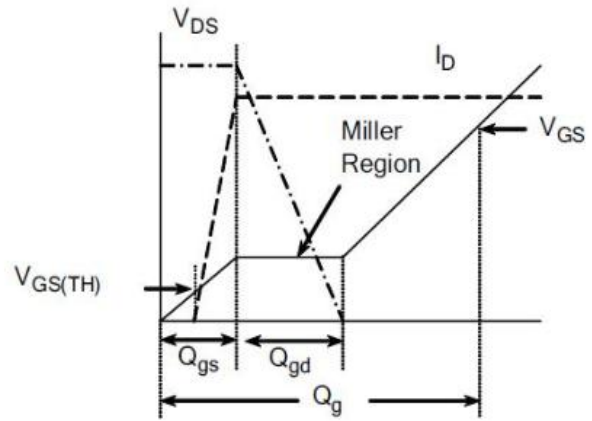


Fig 11. Normalized Maximum Transient Thermal Impedance

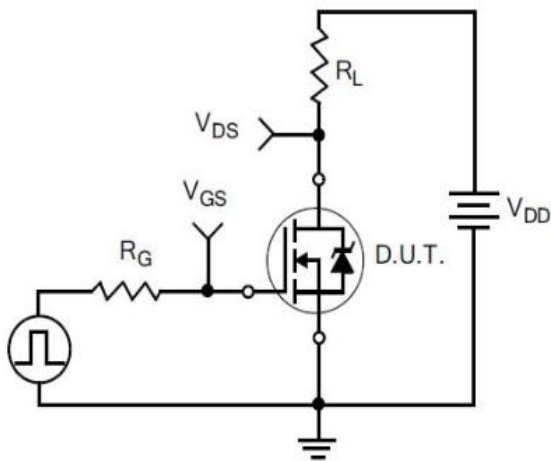
6 Typical Test Circuit and Waveform



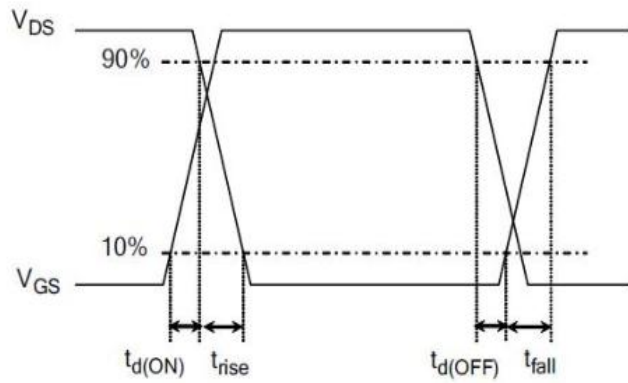
1) Gate Charge Test Circuit



2) Gate Charge Waveform

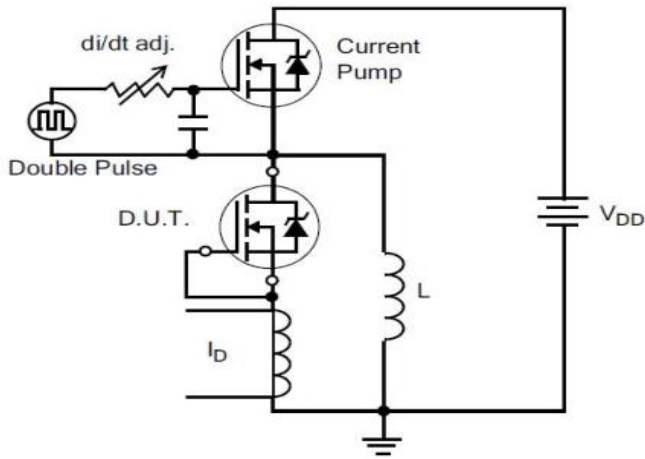


3) Resistive Switching Test Circuit

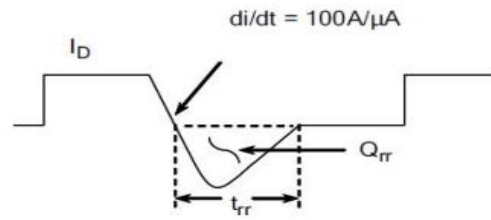


4) Resistive Switching Waveforms

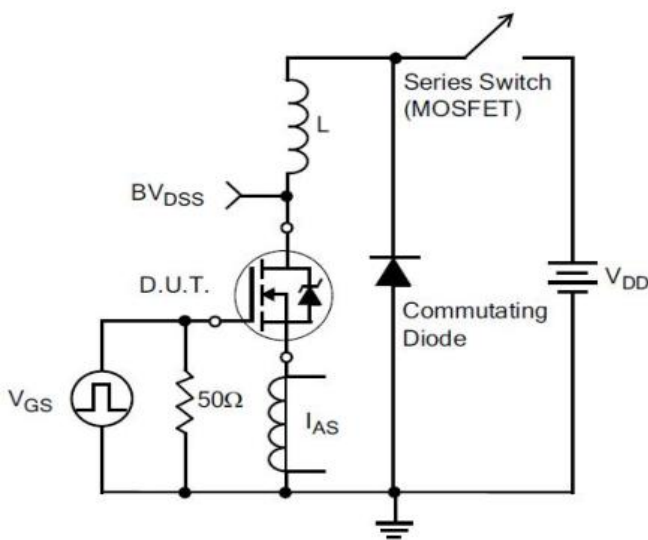
6 Typical Test Circuit and Waveform(continues)



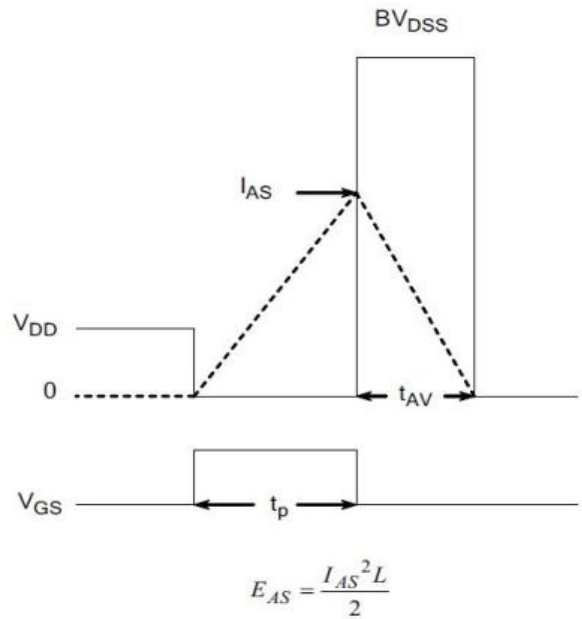
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

7 Product Names Rules

D A S G X X X N E X X N A

LOGO Code: D

Automotive
Blank=Non-Automotive
A=Automotive

Product Line Code
T=Trench MOS
S=SGT MOS
P=Planar MOS
J=Super Junction Mos

Packaging Code
220F: F 220: G
262: I 263: E

RDSON Specification Code
With 3 Digitals,
For Example:
045 on behalf of 45mΩ
380 on behalf of 380mΩ
150D on behalf of 1.5Ω

Channel Polarity Code
N on behalf of N channel
P on behalf of P channel

Reliability level (Last Letter)
Blank=Consumer/Industrial
A=AEC-Q101 Qualified

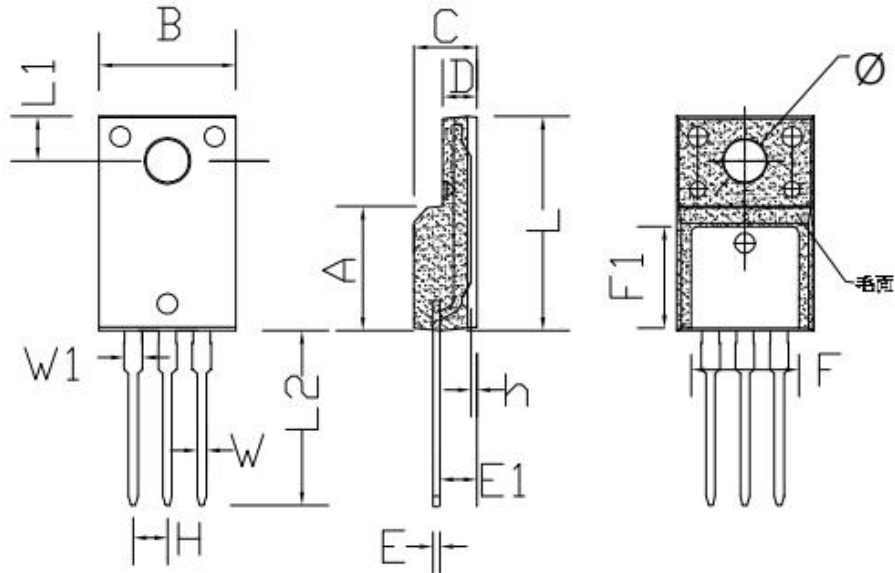
Vth Level	Vth(V)	Driver(V)
N=Normal	2.5~4.0	10~15
L=Logic	1.2~2.4	4.5~8.0
S=Super Logic	0.8~1.2	2.5
U=UltraLogic	0.5~0.8	1.8

Rated Voltage Code
With 2-3 Digitals,
For Example:
06 on behalf of 60V
08 on behalf of 80V
045 on behalf of 45V

Special Function Code
E on behalf of build-in ESD
Nothing on behalf of not ESD

8 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	RoHS	Package	Quantity
DJF380N65T	TO-220F	DJF380N65T	Pb-free	Tube	1000/box

9 Dimensions
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

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
2023.03.10	1.0	Original	10