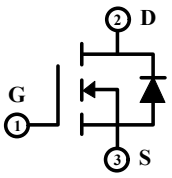
180A 40V N-channel Enhancement Mode Power MOSFET

1 Description

This N-channel enhancement mode power mosfets used advanced trench technology design, provided excellent Rdson and low gate charge. Which accords with the RoHS standard.



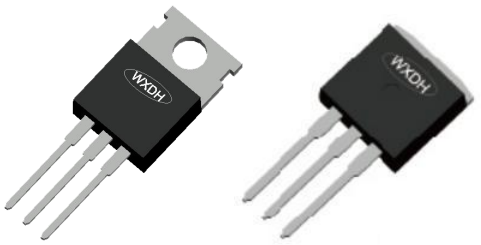
V_{DSS} = 40V

$R_{DS(on)\ (TO-220)TYP}$= 1.5mΩ

$R_{DS(on)\ (TO-262)TYP}$= 1.5mΩ

$I_{D\ (Silicon\ limited)}$ = 300A

$I_{D\ (Package\ limited)}$ = 180A



TO-220 TO-262

2 Features

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

3 Applications

- Motor control and drive
- Battery management
- UPS (Uninterrupible Power Supplies)

4 Electrical Characteristics

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

Parameter		Symbol	Rating	Units
Drian-to-Source Voltage		V_{DSS}	40	V
Gate-to-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current	T_C=25℃（Silicon limited）	I_D	300	A
	T_C=25℃（Package limited）		180	A
	T_C=100℃（Package limited）		180	A
Pulsed Drain Current(1)		I_{DM}	720	A
Single Pulse Avalanche Energy(4)		E_{AS}	1600	mJ
Power Dissipation	T_a=25℃	P_{tot}	2.3	W
	T_C=25℃	P_{tot}	273	W
Junction Temperature Range		T_j	-55～175	℃
Storage Temperature Range		T_{stg}	-55～175	℃

4.2 Thermal Characteristics

Parameter	Symbol	Min	Typ	Max	Units
Thermal Resistance,Junction to Case-sink	R_{thJC}	--	--	0.55	℃/W
Thermal Resistance,Junction to Ambient	R_{thJA}	--	--	65	℃/W

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

Parameter	Symbol	Test Condition	Value			Uni
			Min	Typ	Max	
Off Characteristics						
Drain-to-Source Breakdown Voltage	BV_{DSS}	I_D=250μA,V_{GS}=0V	40	--	--	V
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=40V,V_{GS}=0V,T_C=25℃	--	--	1	μA
		V_{DS}=40V,V_{GS}=0V,T_C=125℃	--	--	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	2	3	4	V
Drain-to-Source on-state Resistance	$R_{DS(on)}$ (TO-220)	V_{GS}=10V,I_D=90A	--	1.5	1.8	mΩ
	$R_{DS(on)}$ (TO-262)	V_{GS}=10V,I_D=90A	--	1.5	1.8	mΩ
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=20V, f=1.0MHz	--	12601	--	pF
Output Capacitance	C_{oss}		--	1204	--	
Reverse Transfer Capacitance	C_{rss}		--	935	--	
Gate Resisitance	R_G	V_{DD}=0V,V_{GS}=0V,F=1MHz	--	10	--	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{gs}=10V, V_{ds}=20V, I_d=90A, R_g=3Ω	--	27	--	nS
Turn-on Rise Time	t_r		--	78	--	
Turn-off Delay Time	$t_{d(off)}$		--	159	--	
Turn-off Fall Time	t_f		--	85	--	
Total Gate Charge	Q_g	V_{gs}=10V, V_{ds}=20V, I_d=90A	--	193	--	nC
Gate-to-Source Charge	Q_{gs}		--	76	--	
Gate-to-Drain(“Miller”)	Q_{gd}		--	33	--	
Drain-Source Diode Characteristics						
Diode Forward Voltage(3)	V_{SD}	V_{GS}=0V,I_S=90A	--	--	1.2	V
Diode Forward Current	I_S		--	--	180	A
Reverse Recovery Time(3)	t_{rr}	T_J=25℃,I_F=90A dI$_F$/dt=100A/us, V_{GS}=0V	--	43	--	nS
Reverse Recovery	Q_{rr}		--	57	--	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=0.5mH ,V_{DD}=20V,V_{GATE}=20V,Start T_J=25℃.

5.Typical characteristics diagrams

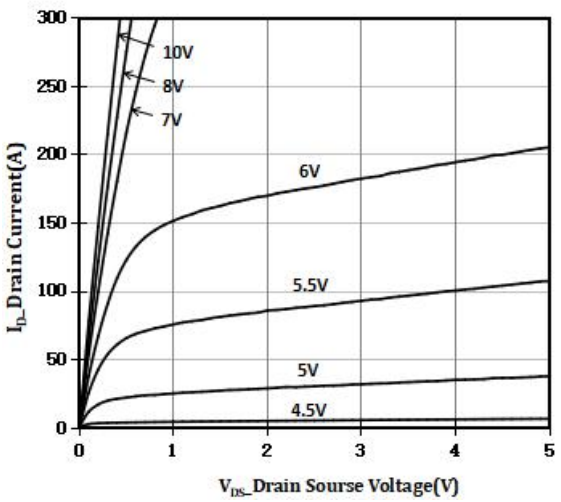


Figure 1 Output Characteristics

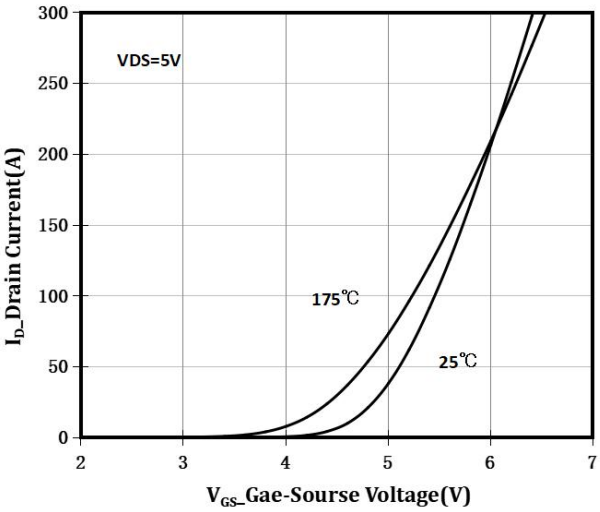


Figure 2 Transfer Characteristics

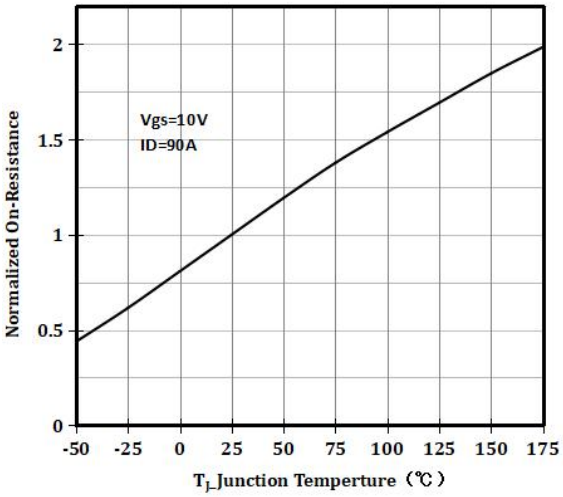


Figure 3 Rdson-JunctionTemperature

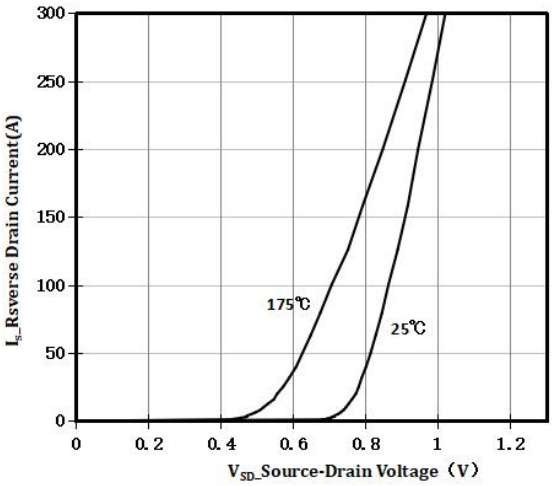


Figure 4 Source- Drain Diode Forward

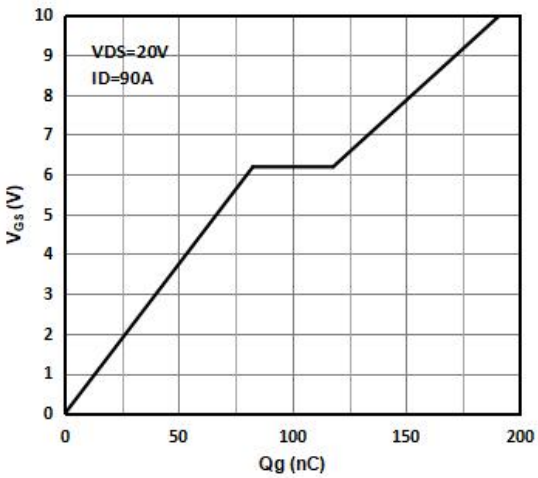


Figure 5 Gate Charge

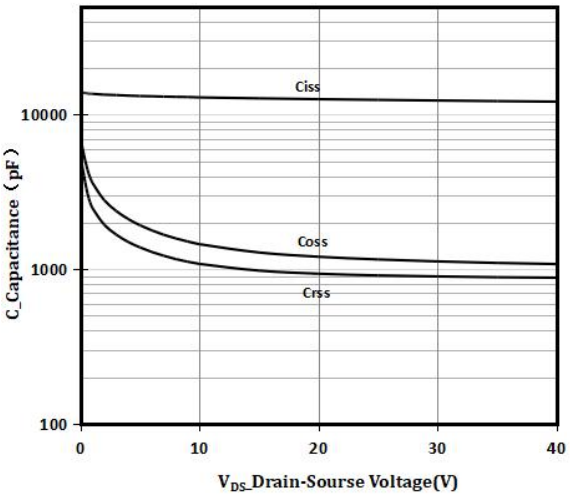


Figure 6 Capacitance vs Vds

5 Typical characteristics diagrams(continues)

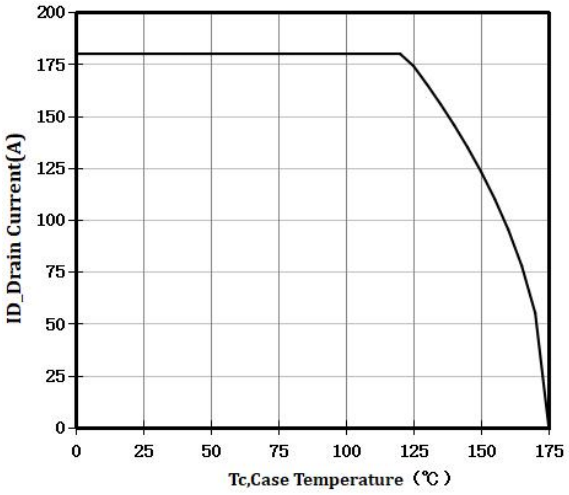


Figure 7. ID Current De-rating

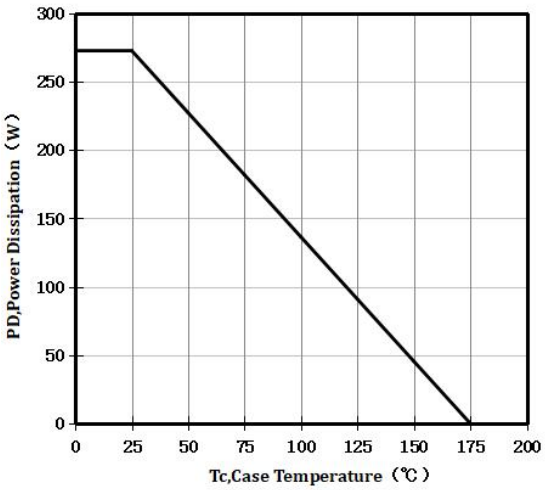


Figure 8. Power De-rating

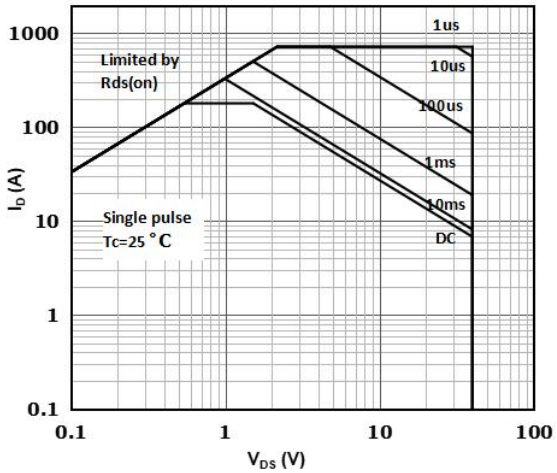


Figure 9 Safe Operation Area

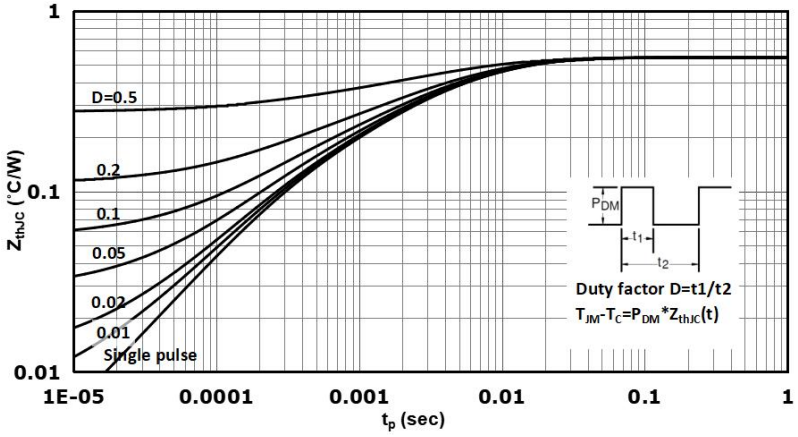
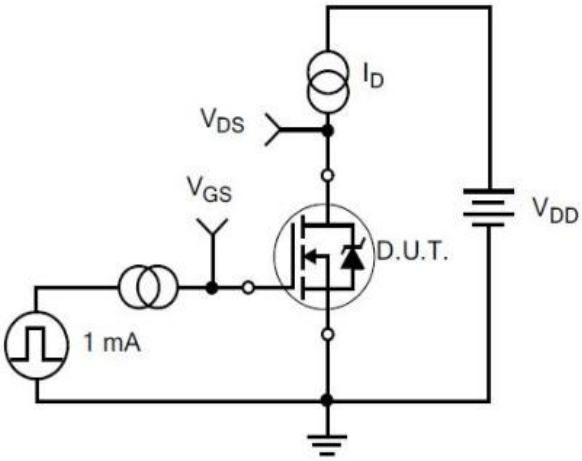
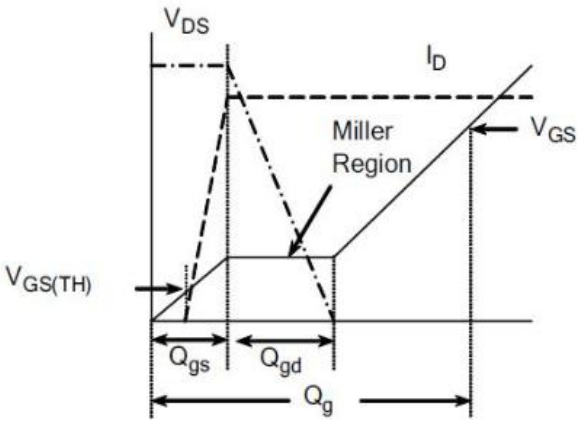


Fig 10. Normalized Maximum Transient Thermal Impedance

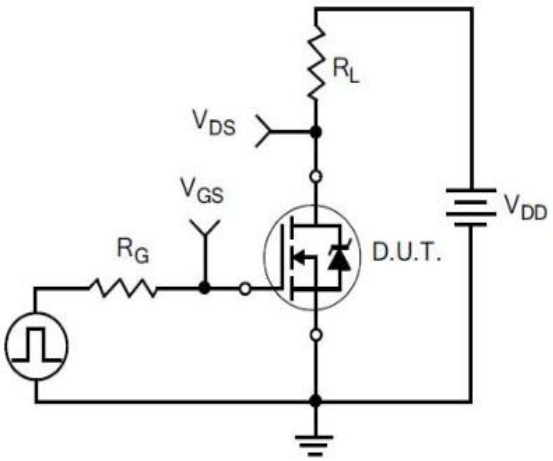
6 Typical Test Circuit and Waveform



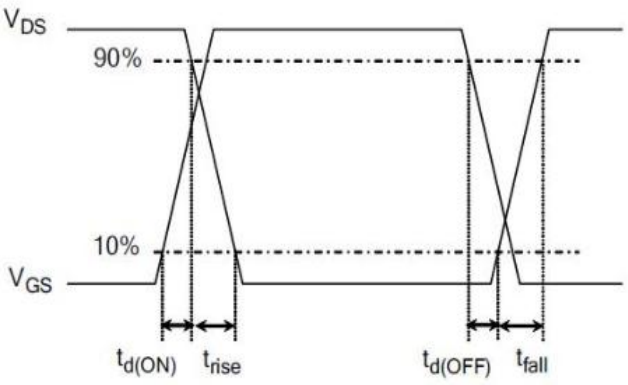
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

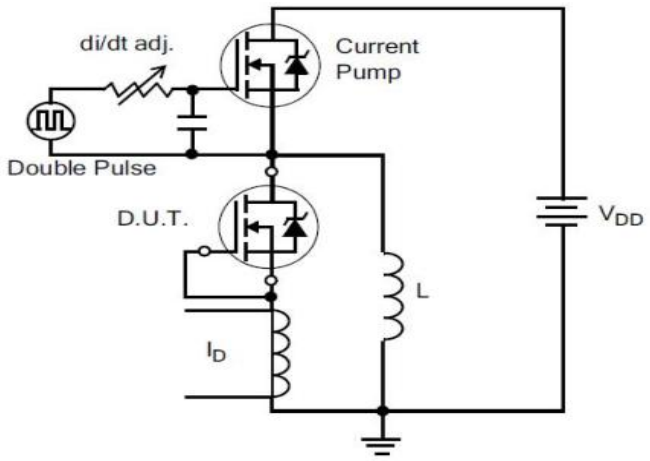


3) Resistive Switching Test Circuit

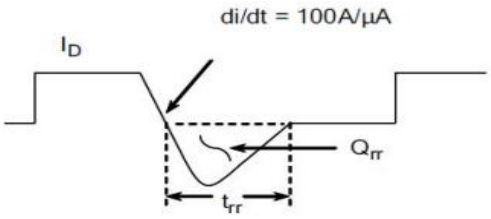


4) Resistive Switching Waveforms

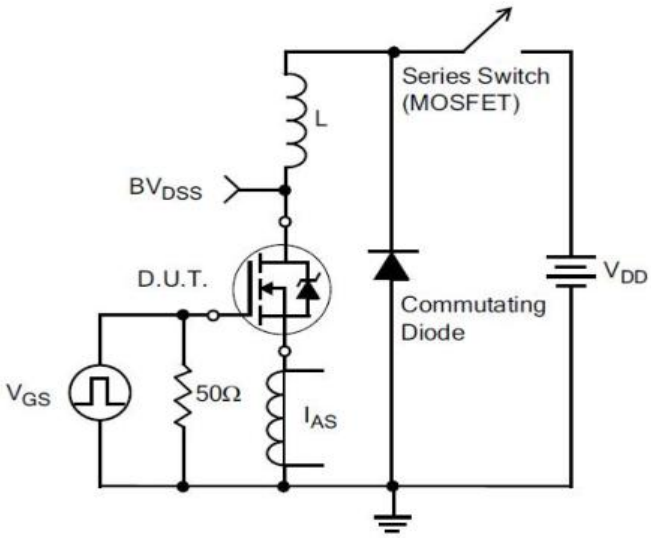
6 Typical Test Circuit and Waveform(continues)



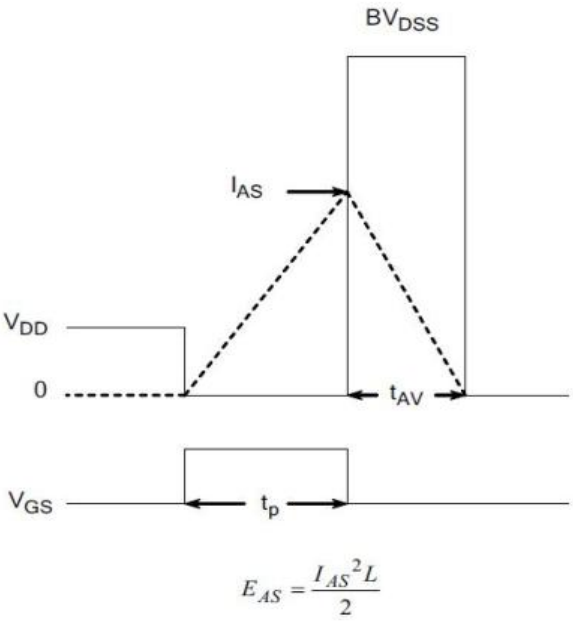
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

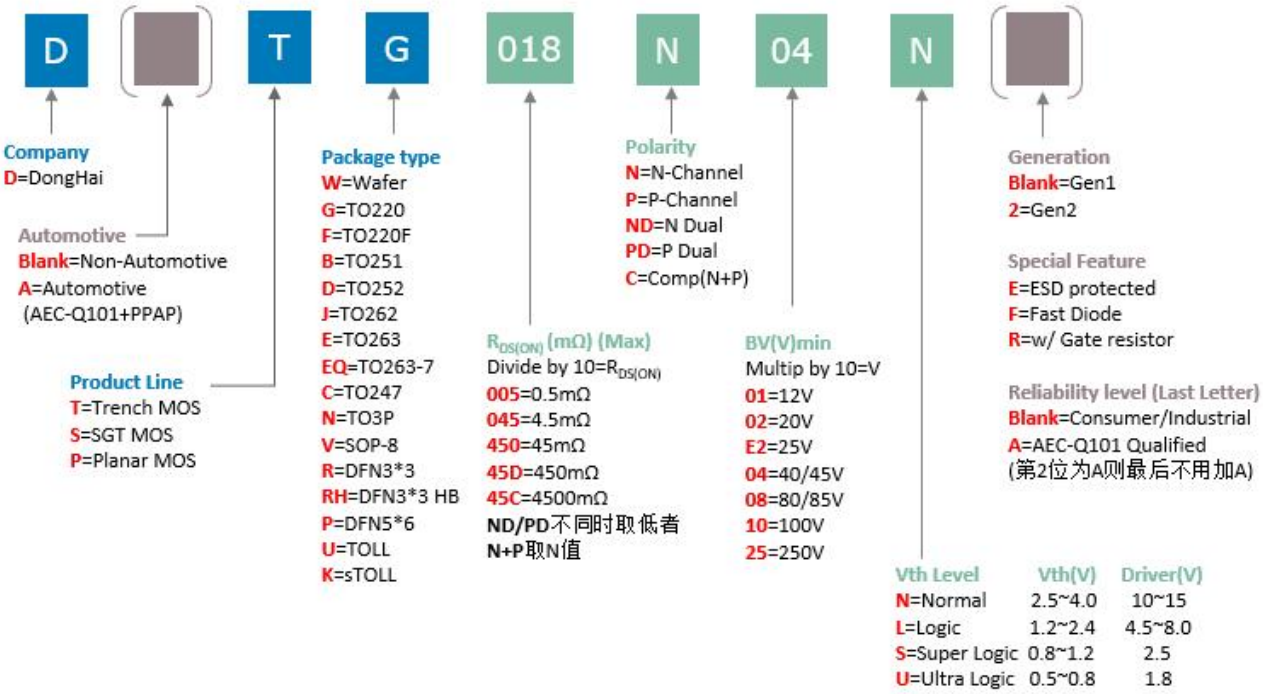


7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

7 Product Names Rules

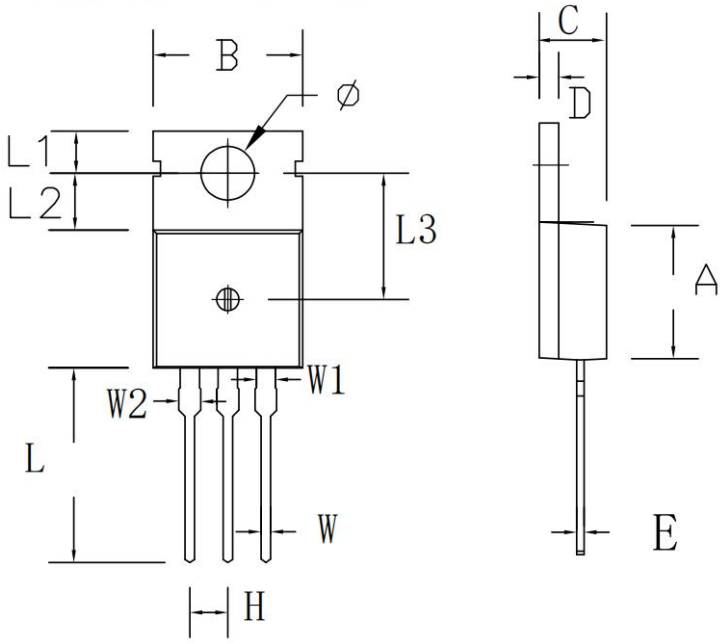


8 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	RoHS	Package	Quantity
DTG018N04N	TO-220	DTG018N04N	Pb-free	Tube	1000/box
DTJ018N04N	TO-262	DTJ018N04N	Pb-free	Tube	1000/box

9 Dimensions

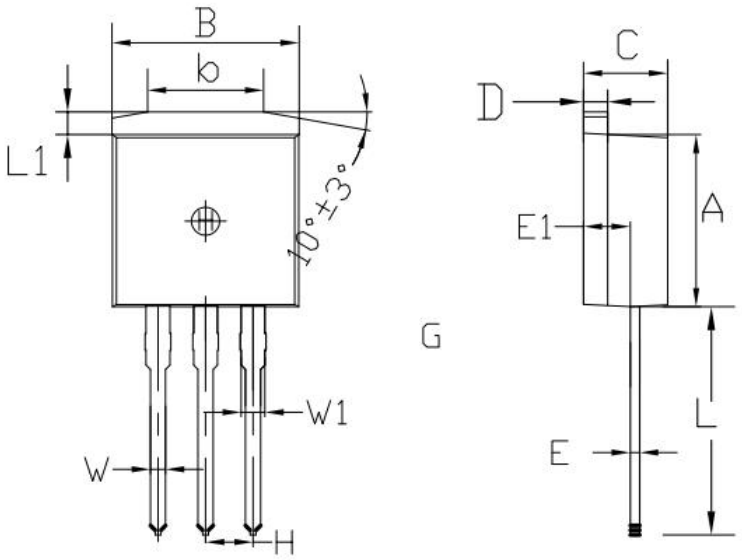
TO-220C PACKAGE OUTLINE DIMENSIONS



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	4.30	4.75	0.169	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	0.69	0.95	0.027	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

9 Dimensions(continues)

TO-262 PACKAGE OUTLINE DIMENSIONS



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	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

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
2022.11.07	1.0	Original	10