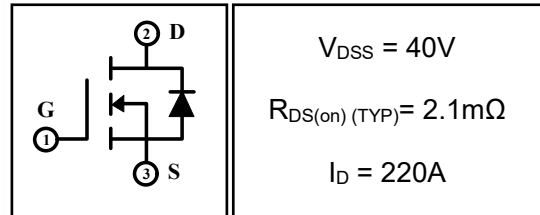


220A 40V N-channel Enhancement Mode Power MOSFET

1 Description

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



2 Features

- AEC Q101 qualified
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- Green Product (RoHS compliant)
- Fast switching
- 100% single pulse avalanche energy test

3 Applications

- Automotive application
- Power switching applications
- Inverter management system
- Power tools



4 Electrical Characteristics

4.1 Absolute Maximum Ratings (T_c=25°C, unless otherwise noted)

Parameter	Symbol	Rating	Units
Drain-to-Source Voltage	V_{DSS}	40	V
Gate-to-Source Voltage	V_{GSS}	±20	V
Continuous Drain Current	$T_C=25^\circ C$	I_D	220
	$T_C=100^\circ C$		155
Pulsed Drain Current ⁽¹⁾	I_{DM}	880	A
Single Pulse Avalanche Energy ⁽⁴⁾	E_{AS}	1056	mJ
Power Dissipation	$T_a=25^\circ C$	P_{tot}	2.3
	$T_C=25^\circ C$	P_{tot}	215
Junction Temperature Range	T_j	-55~175	°C
Storage Temperature Range	T_{stg}	-55~175	°C

4.2 Thermal Characteristics

Parameter	Symbol	Min	Typ	Max	Units
Thermal Resistance, Junction to Case-sink	R_{thJC}	--	--	0.7	°C/W
Thermal Resistance, Junction to Ambient	R_{thJA}	--	--	66	°C/W

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

Parameter	Symbol	Test Condition	Value			Units
			Min	Typ	Max	
Off Characteristics						
Drain-to-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	40	45	--	V
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V, T_C=25^\circ C$	--	--	1	μA
		$V_{DS}=40V, V_{GS}=0V, T_C=125^\circ C$	--	--	100	μA
Gate-to-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	V
Drain-to-Source on-state	$R_{DS(on)}$	$V_{GS}=10V, I_D=75A$	--	2.1	2.5	m Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=20V, f=1.0MHz$	--	7317	--	pF
Output Capacitance	C_{oss}		--	768	--	
Reverse Transfer Capacitance	C_{rss}		--	576	--	
Gate Resisitance	R_G	$V_{DD}=0V, V_{GS}=0V, F=1MHz$	--	2.6	--	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{gs}=10V, V_{ds}=20V, I_d=120A, R_g=3.5\Omega$	--	20	--	nS
Turn-on Rise Time	t_r		--	127	--	
Turn-off Delay Time	$t_{d(off)}$		--	73	--	
Turn-off Fall Time	t_f		--	113	--	
Total Gate Charge	Q_g	$V_{gs}=10V, V_{ds}=20V, I_d=30A$	--	120	--	nC
Gate-to-Source Charge	Q_{gs}		--	35.7	--	
Gate-to-Drain("Miller")	Q_{gd}		--	28.3	--	
Drain-Source Diode Characteristics						
Diode Forward Voltage ⁽³⁾	V_{SD}	$V_{GS}=0V, I_S=30A$	--	--	1.2	V
Diode Forward Current	I_S		--	--	220	A
Reverse Recovery Time ⁽³⁾	t_{rr}	$T_J=25^\circ C, I_F=30A, di_F/dt=100A/us, V_{GS}=0V$	--	27	--	nS
Reverse Recovery	Q_{rr}		--	15	--	nC

Notes:

- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board, $t \leq 10sec$.
- 3: Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 4: $L=0.5mH, I_D=65A, V_{DD}=20V, V_{GATE}=20V, Start T_J=25^\circ C$.

5. Typical characteristics diagrams

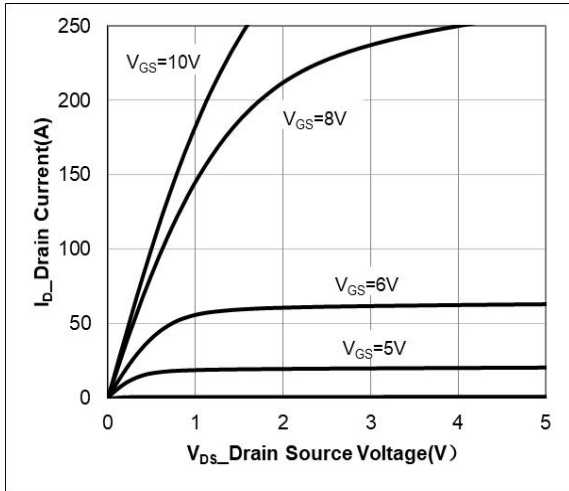


Figure 1 Output Characteristics

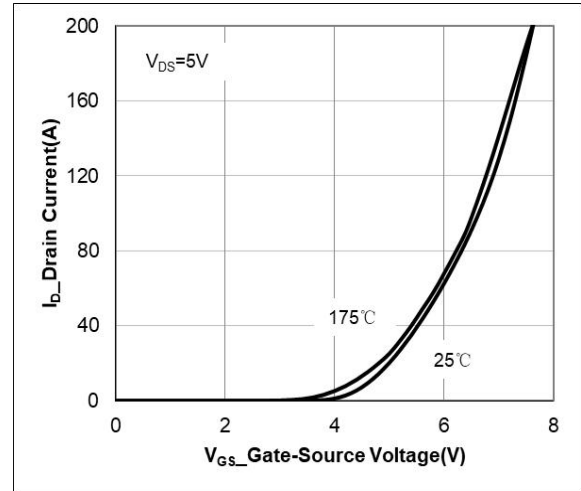


Figure 2 Transfer Characteristics

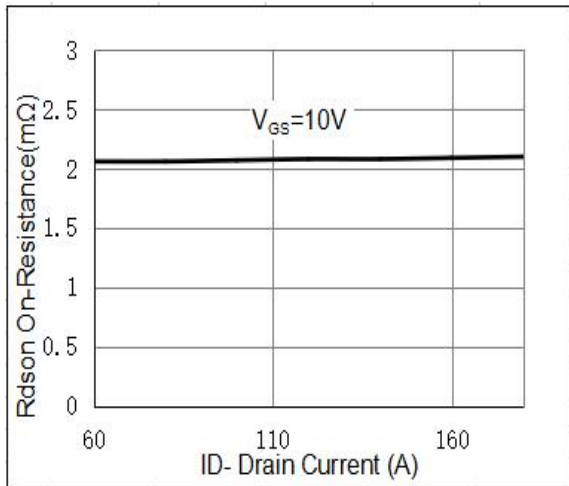


Figure 3 Rdson- Drain Current

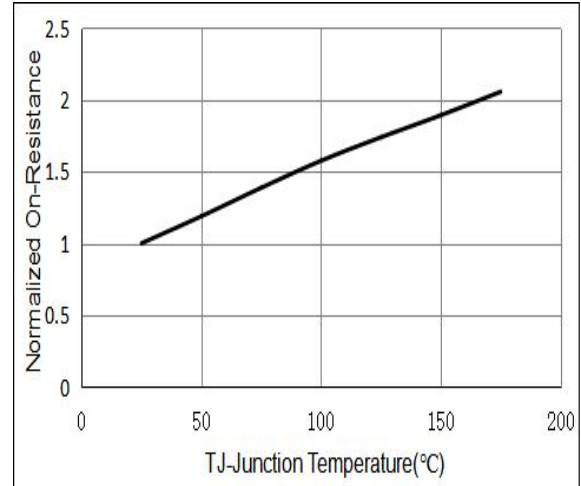


Figure 4 Rdson-Junction Temperature

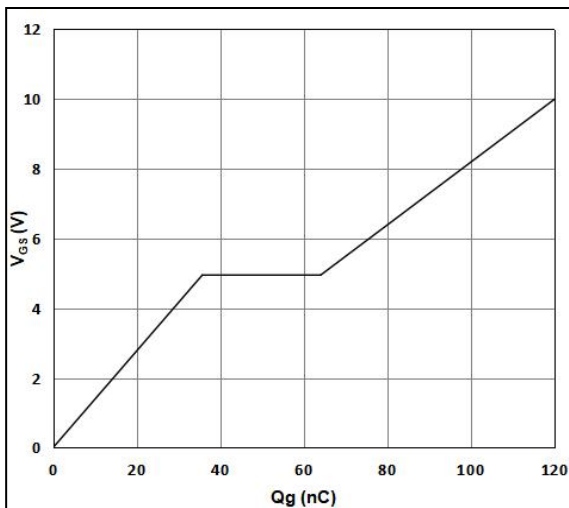


Figure 5 Gate Charge

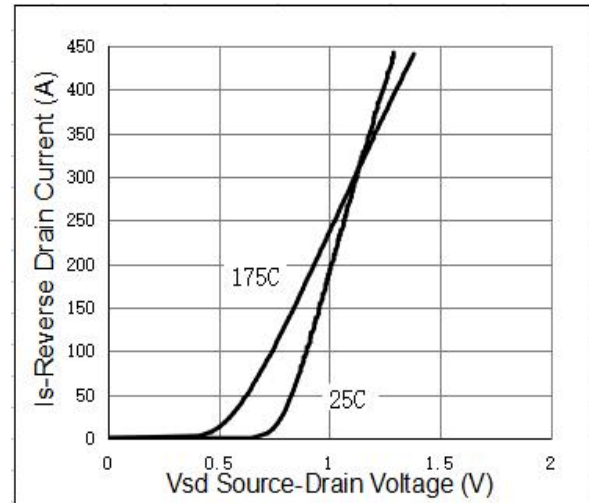


Figure 6 Source- Drain Diode Forward

5 Typical characteristics diagrams(continues)

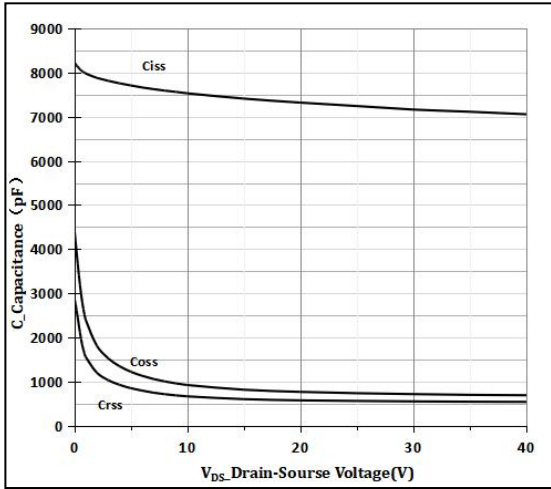


Figure 7 Capacitance vs Vds

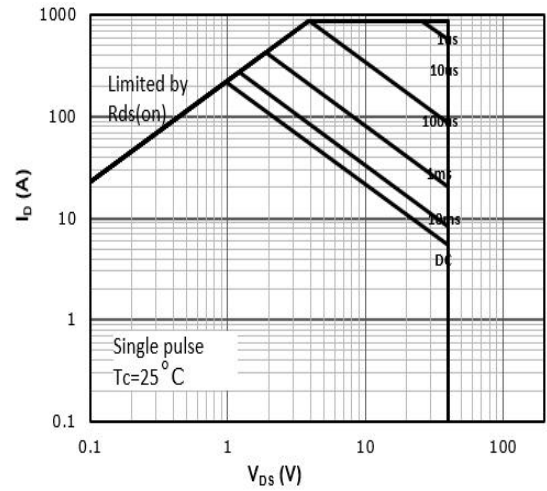


Figure 8 Safe Operation Area

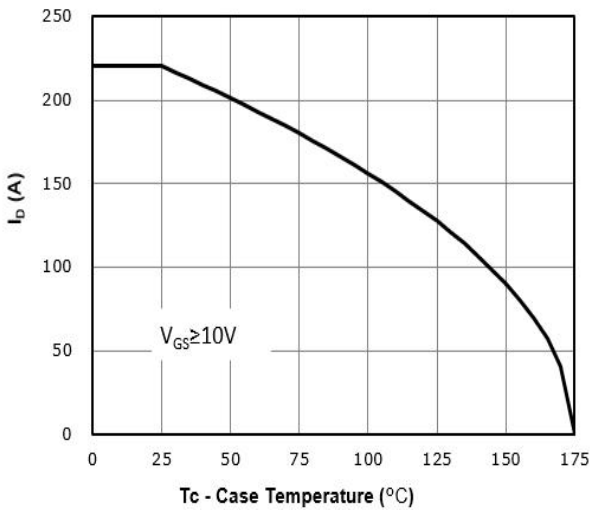


Figure 9. ID Current De-rating

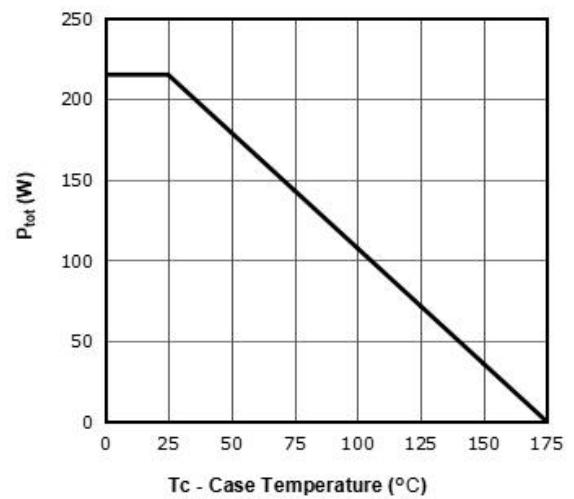


Figure 10. Power De-rating

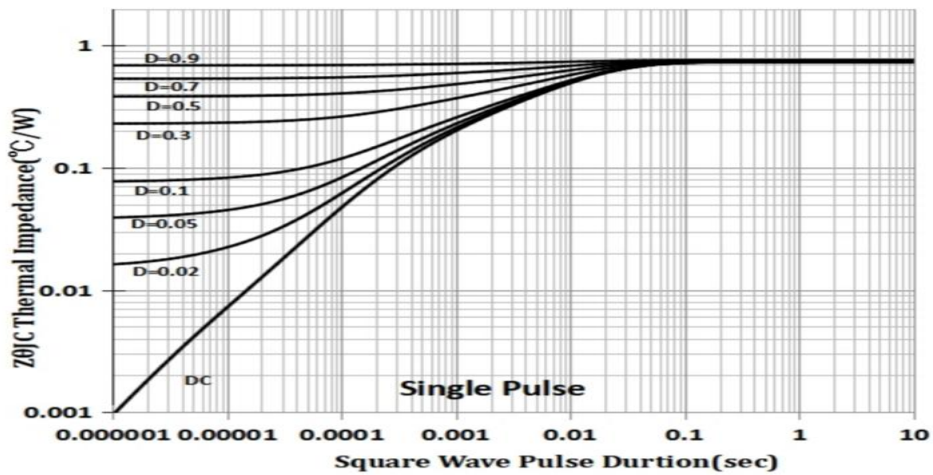
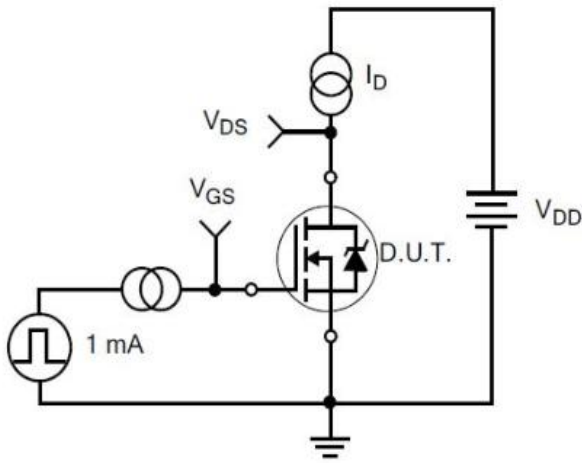
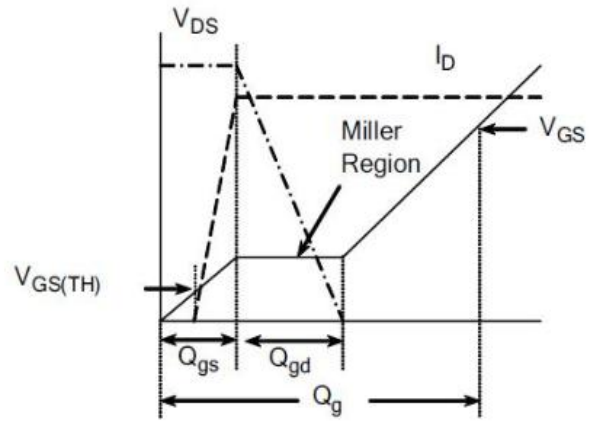


Fig 11. Normalized Maximum Transient Thermal Impedance

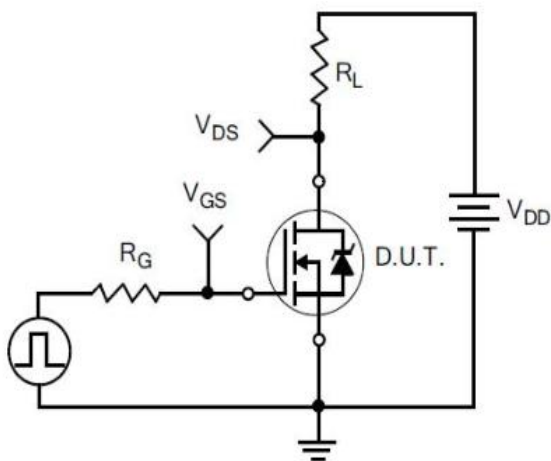
6 Typical Test Circuit and Waveform



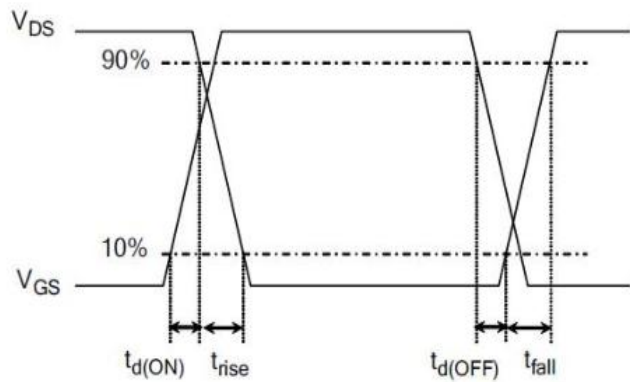
1) Gate Charge Test Circuit



2) Gate Charge Waveform

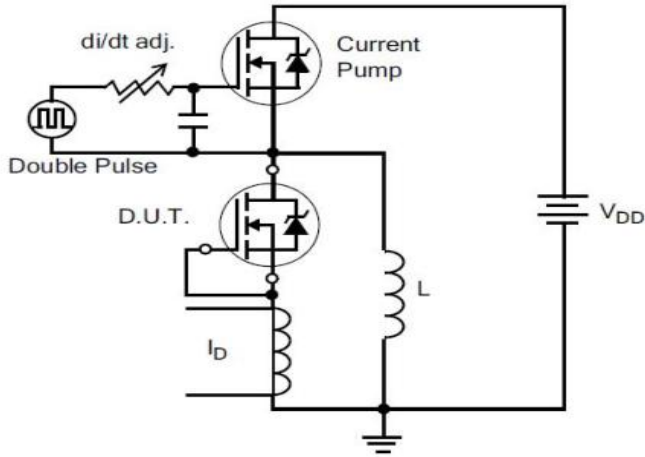


3) Resistive Switching Test Circuit

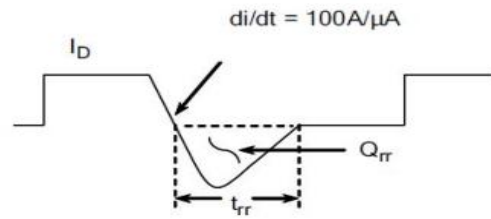


4) Resistive Switching Waveforms

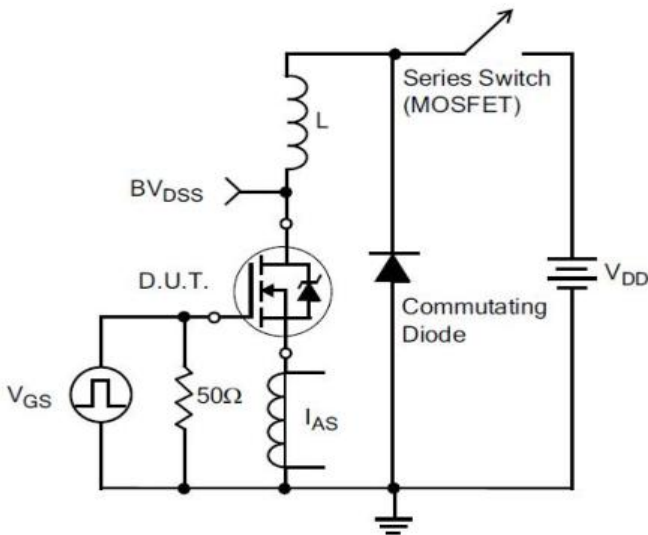
6 Typical Test Circuit and Waveform(continues)



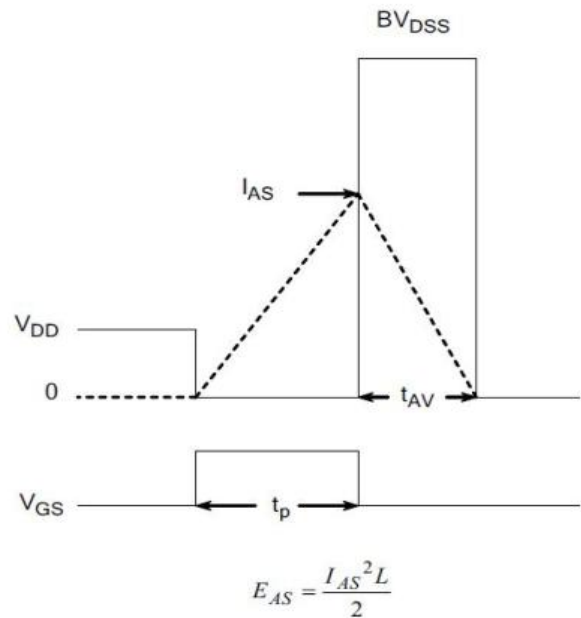
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

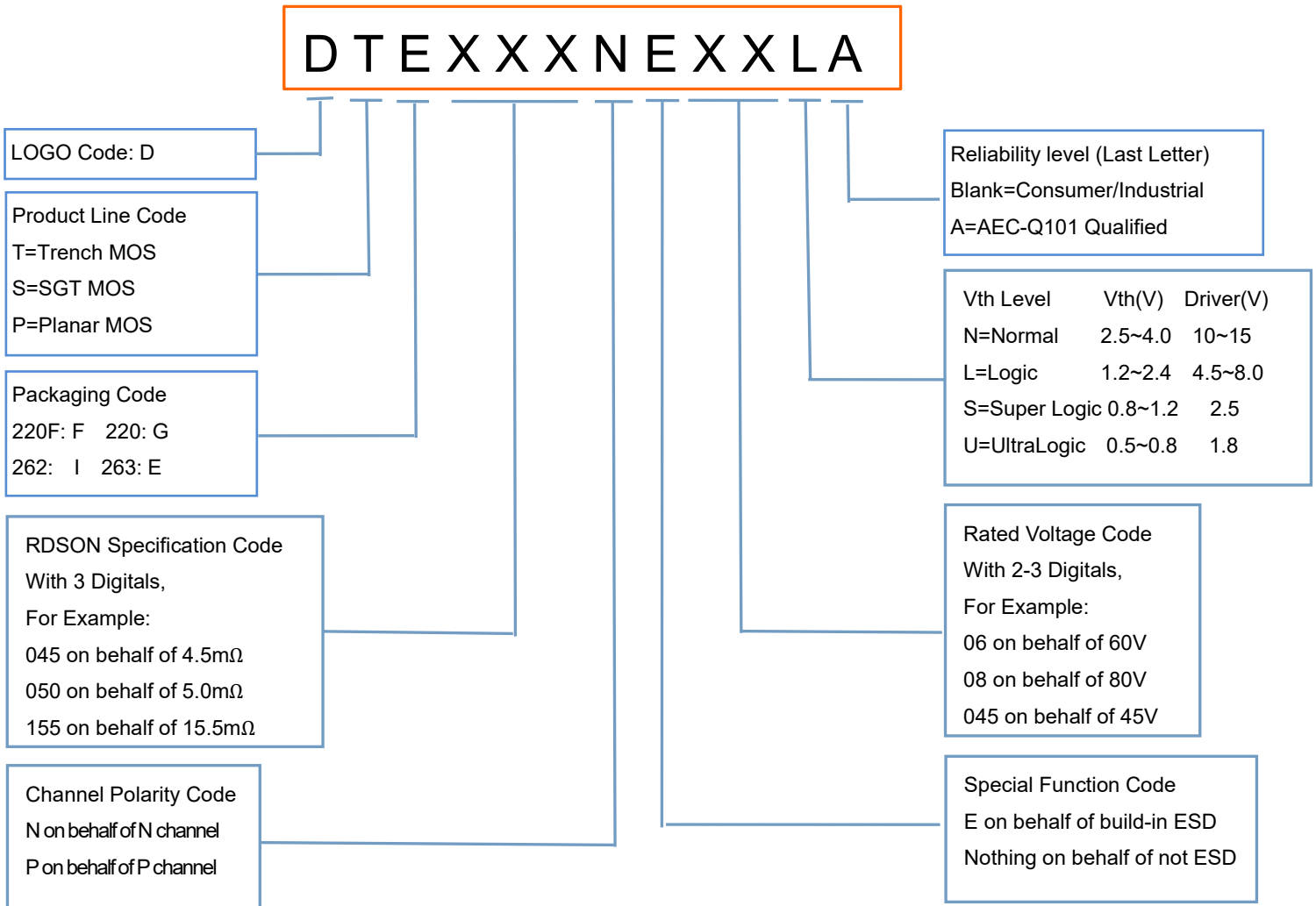


7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

7 Product Names Rules

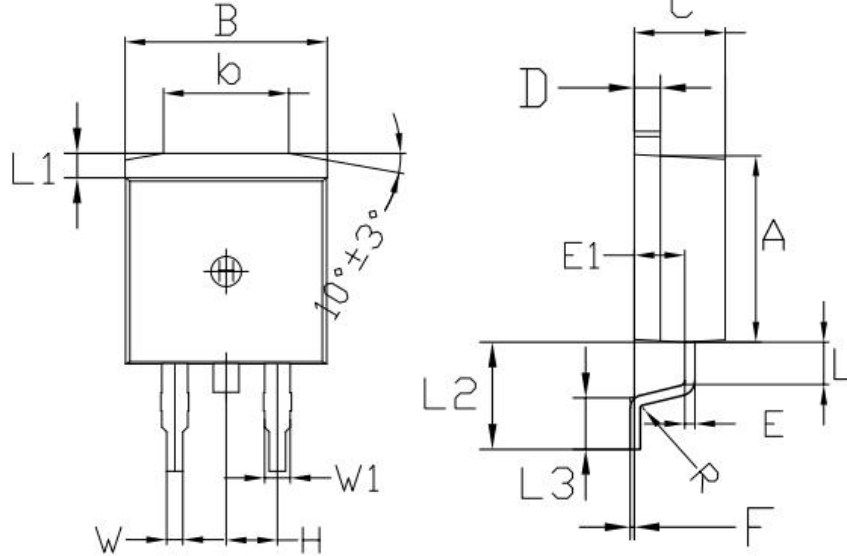


8 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	RoHS	Package	Quantity
DTE025N04NA	TO-263	DTE025N04NA	Pb-free	Tape & Reel	800/box
DTG025N04NA	TO-220	DTG025N04NA	Pb-free	Tube	1000/box

9 Dimensions

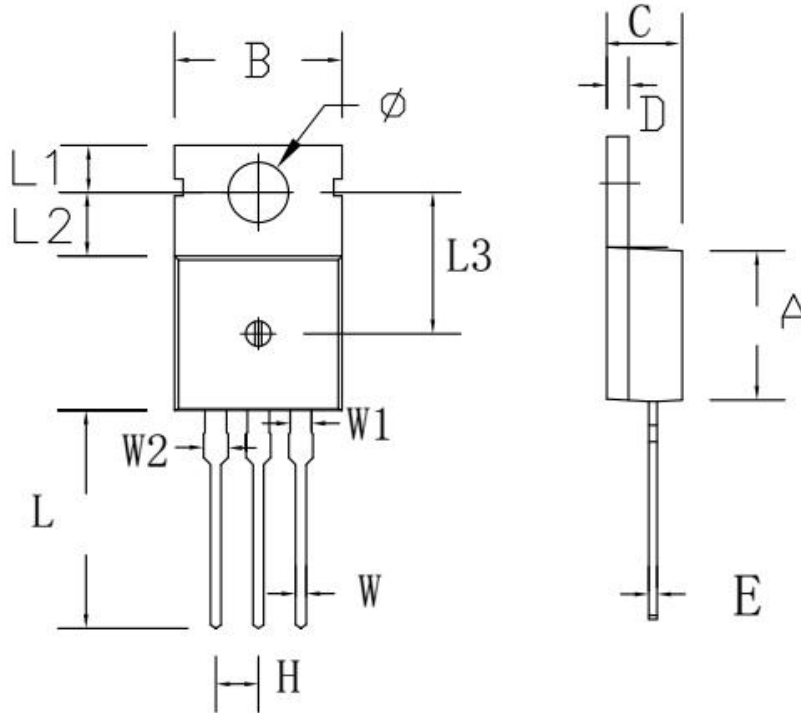
TO-263 PACKAGE OUTLINE DIMENSIONS



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

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

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
2022.09.07	1.0	Original	9