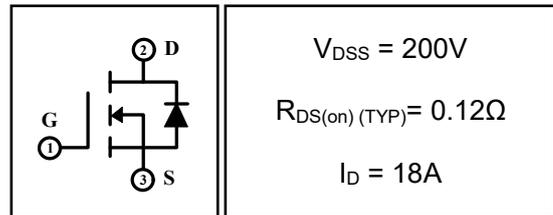


18A 200V N-channel Enhancement Mode Power MOSFET

1 Description

These 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
- Low on resistance
- Low gate charge
- Low reverse transfer capacitances
- 100% single pulse avalanche energy test
- 100% ΔV_{DS} test

3 Applications

- High efficiency switch mode power supplies.
- Power switch circuit of adaptor and charger.
- UPS
- Inverter



4 Electrical Characteristics

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

Parameter	Symbol	Rating			Units	
		DH640	DHI640 DHE640	DHF640		
Drain-to-Source Voltage	V_{DSS}	200			V	
Gate-to-Source Voltage	V_{GSS}	± 20			V	
Continuous Drain Current	$T_C=25^\circ C$	18			A	
	$T_C=100^\circ C$	12			A	
Pulsed Drain Current ⁽¹⁾	I_{DM}	72			A	
Single Pulse Avalanche Energy ⁽⁴⁾	E_{AS}	262			mJ	
Avalanche Current ⁽⁴⁾	I_{AS}	7.3			A	
Power Dissipation	$T_a=25^\circ C$	2	2	2	W	
	$T_C=25^\circ C$	104	104	63	W	
Isolation Voltage	V_{ISO}	/			2500	V
Junction Temperature Range	T_j	-55 ~ 150			$^\circ C$	
Storage Temperature Range	T_{stg}	-55 ~ 150			$^\circ C$	
Maximum Temperature for soldering	T_L	300			$^\circ C$	

4.2 Thermal Characteristics

Parameter	Symbol	Rating			Unit
		DH640	DHI640 DHE640	DHF640	
Thermal Resistance, Junction to Case-sink	R_{thJC}	1.2	1.2	1.98	$^\circ C/W$
Thermal Resistance, Junction to Ambient	R_{thJA}	62.5	62.5	62.5	$^\circ C/W$

4.3 Electrical Characteristics ($T_C=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Condition	Value			Units
			Min	Typ	Max	
Off Characteristics						
Drain-to-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	200	--	--	V
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS}=200\text{V}, V_{GS}=0\text{V}, T_C=25^\circ\text{C}$	--	--	1	μA
		$V_{DS}=160\text{V}, V_{GS}=0\text{V}, T_C=125^\circ\text{C}$	--	--	100	μA
Gate-to-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20\text{V}$	--	--	± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2	--	4	V
Drain-to-Source on-state Resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}, I_D=9\text{A}$	--	0.12	0.15	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{GS}=0\text{V},$ $V_{DS}=25\text{V},$ $f=1.0\text{MHz}$	--	1200	--	pF
Output Capacitance	C_{oss}		--	161	--	
Reverse Transfer Capacitance	C_{rss}		--	70	--	
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$I_D=18\text{A},$ $V_{DD}=100\text{V},$ $V_{GS}=10\text{V},$ $R_G=25\Omega$	--	40	--	nS
Turn-on Rise Time	t_r		--	33	--	
Turn-off Delay Time	$t_{d(off)}$		--	166	--	
Turn-off Fall Time	t_f		--	60	--	
Total Gate Charge	Q_g	$I_D=18\text{A},$ $V_{DD}=160\text{V},$ $V_{GS}=10\text{V}$	--	38	--	nC
Gate-to-Source Charge	Q_{gs}		--	6	--	
Gate-to-Drain("Miller") Charge	Q_{gd}		--	16	--	
Drain-Source Diode Characteristics						
Diode Forward Voltage ⁽³⁾	V_{FSD}	$V_{GS}=0\text{V}, I_S=9\text{A}$	--	--	1.4	V
Diode Forward Current	I_S		--	--	18	A
Reverse Recovery Time ⁽³⁾	t_{rr}	$T_J=25^\circ\text{C}, I_F=18\text{A},$ $di_F/dt=100\text{A}/\mu\text{S}, V_{GS}=0\text{V}$	--	182	--	nS
Reverse Recovery Charge ⁽³⁾	Q_{rr}		--	1290	--	nC

Notes:

- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board, $t \leq 10\text{sec}$.
- 3: Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- 4: $L=0.5\text{mH}, I_D=7.3\text{A}, V_{DD}=80\text{V}, R=25\Omega, V_{GATE}=200\text{V}$, Start $T_J=25^\circ\text{C}$.

5 Typical characteristics diagrams

Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

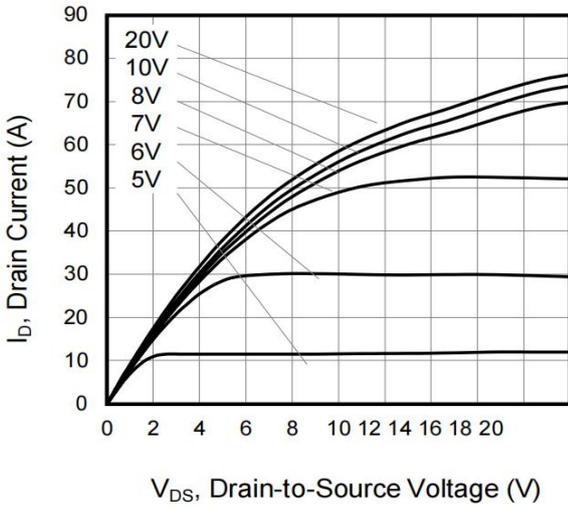


Figure 2. Body Diode Forward Voltage

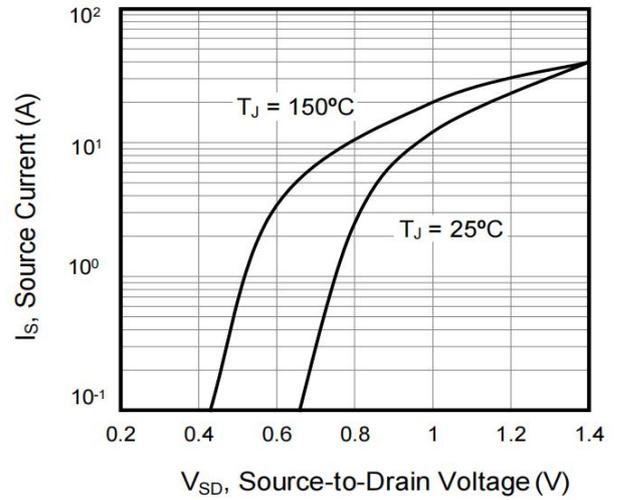


Figure 3. Drain Current vs. Temperature

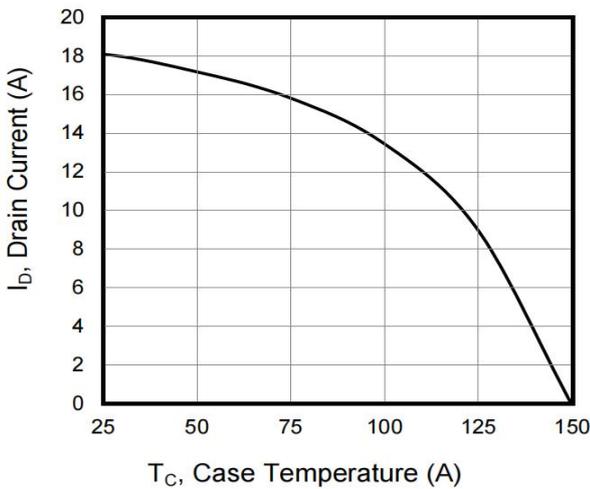


Figure 4. BV_{DSS} Variation vs. Temperature

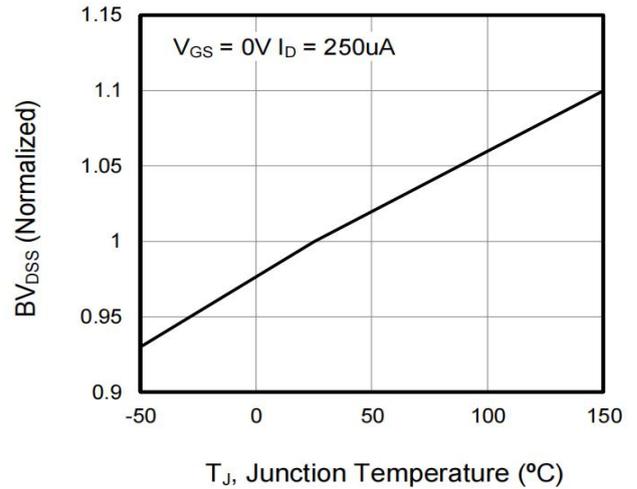


Figure 5. Transfer Characteristics

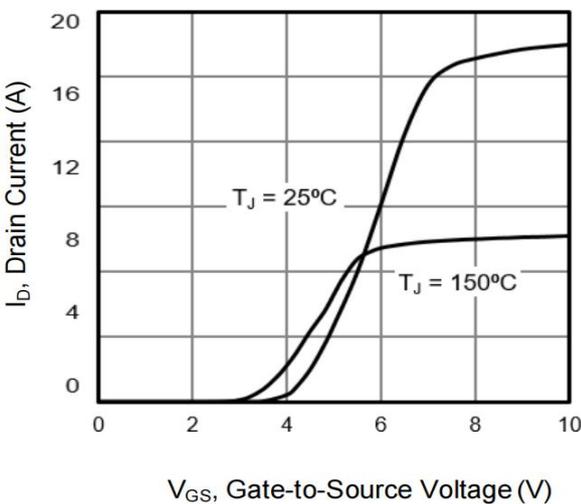
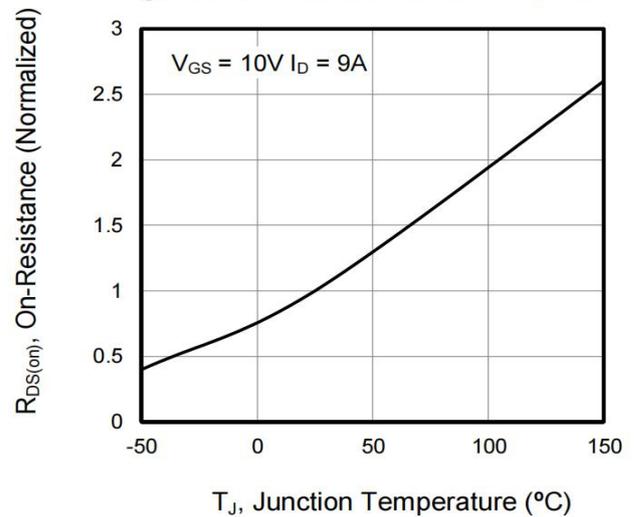


Figure 6. On-Resistance vs. Temperature



5 Typical characteristics diagrams(continues)

Figure 7. Capacitance

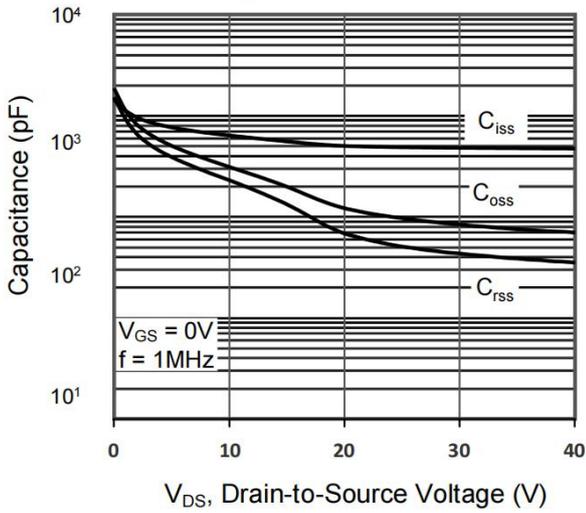


Figure 8. Gate Charge

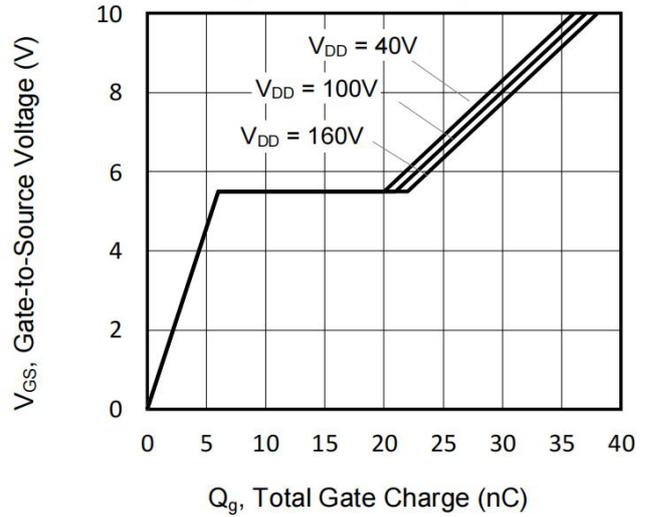


Figure 9. Transient Thermal Impedance TO-220F

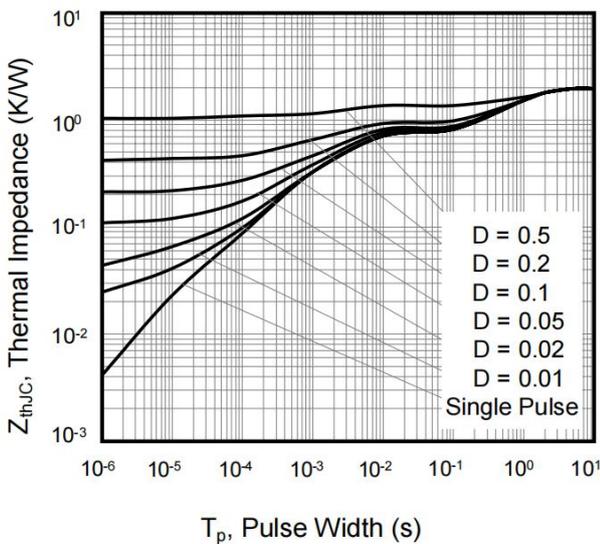
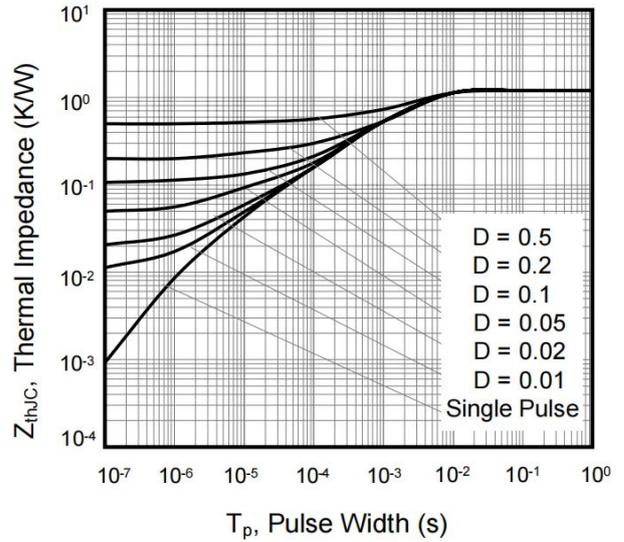
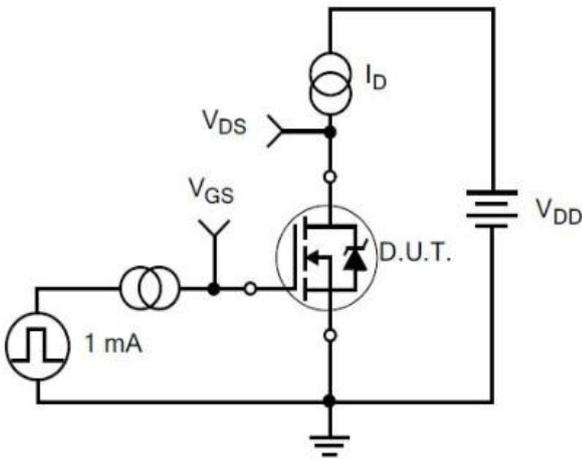


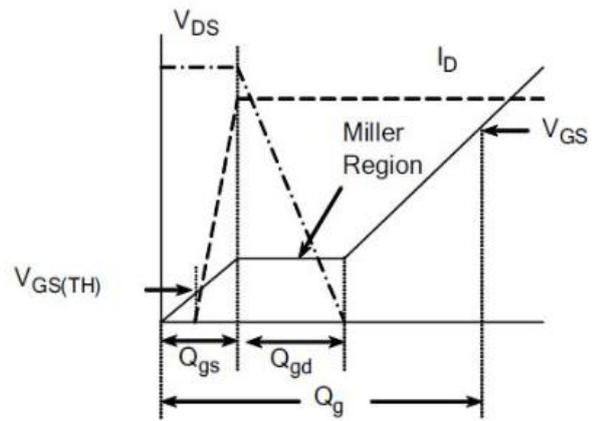
Figure 10. Transient Thermal Impedance TO-220



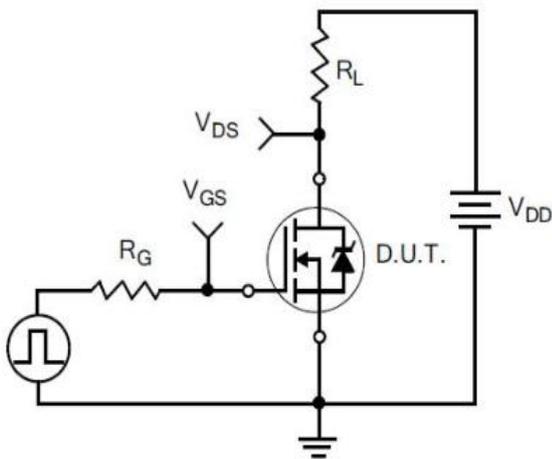
6 Typical Test Circuit and Waveform



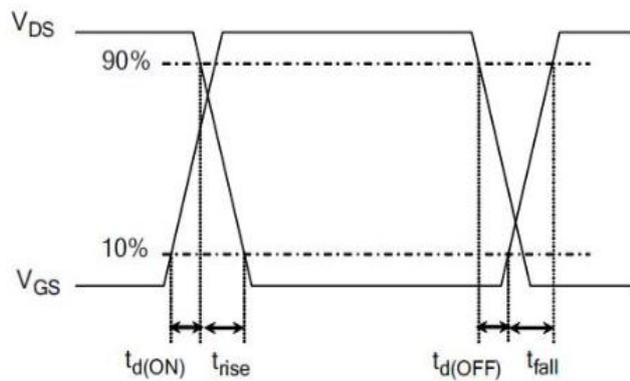
1) Gate Charge Test Circuit



2) Gate Charge Waveform

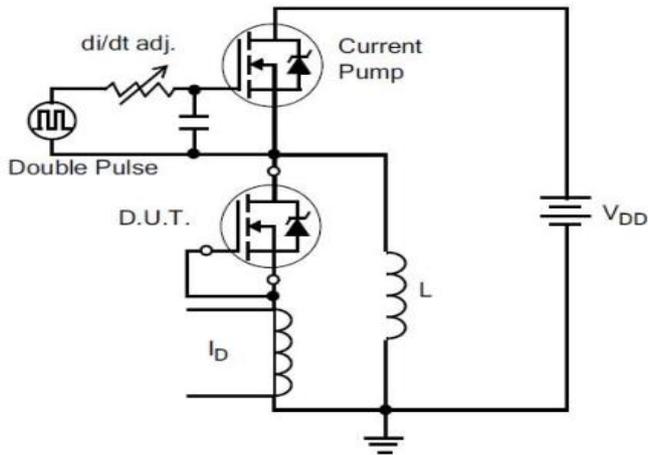


3) Resistive Switching Test Circuit

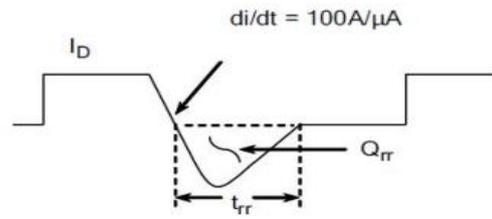


4) Resistive Switching Waveforms

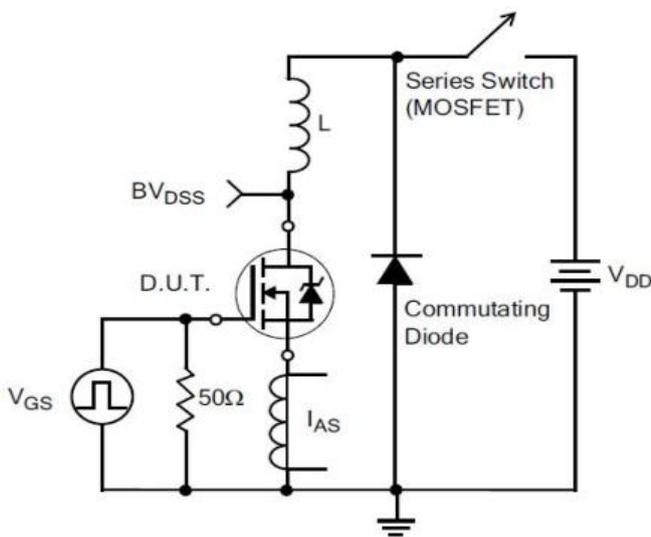
6 Typical Test Circuit and Waveform(continues)



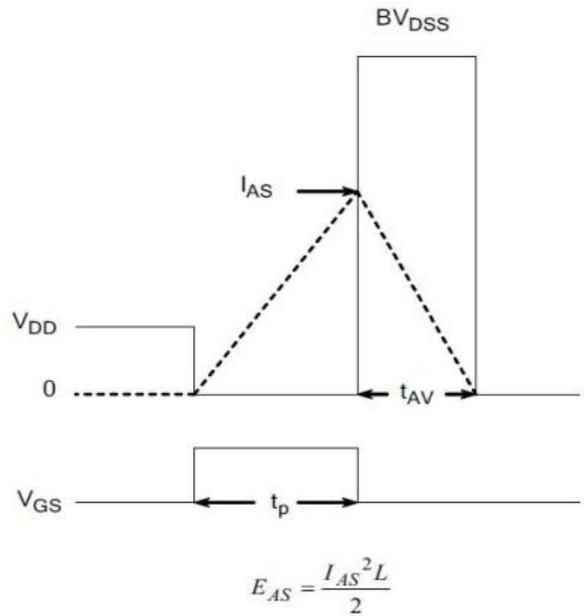
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

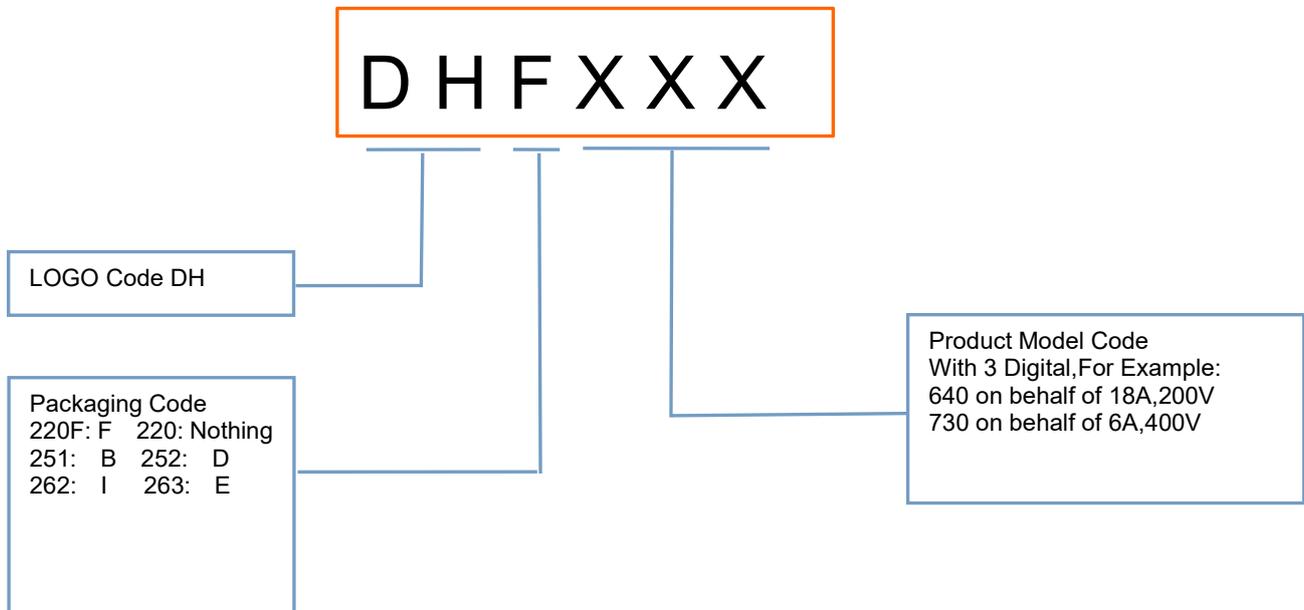


7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

7 Product Names Rules

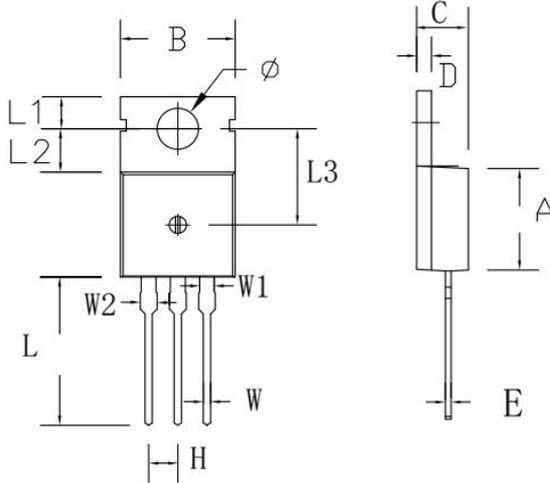


8 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	RoHS	Package	Quantity
DH640	TO-220	DH640	Pb-free	Tube	1000/box
DHF640	TO-220F	DHF640	Pb-free	Tube	1000/box
DHI640	TO-262	DHI640	Pb-free	Tube	1000/box
DHE640	TO-263	DHE640	Pb-free	Tape & Reel	800/box

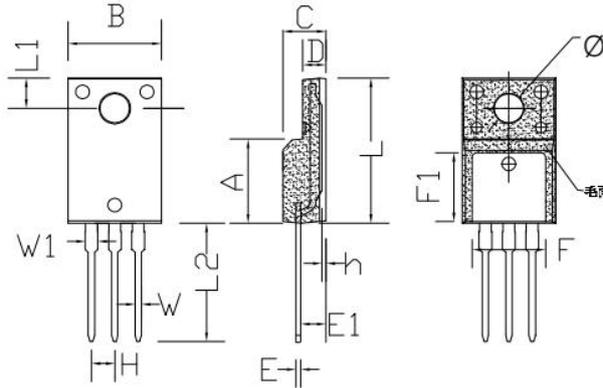
9 Dimensions

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	4.25	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

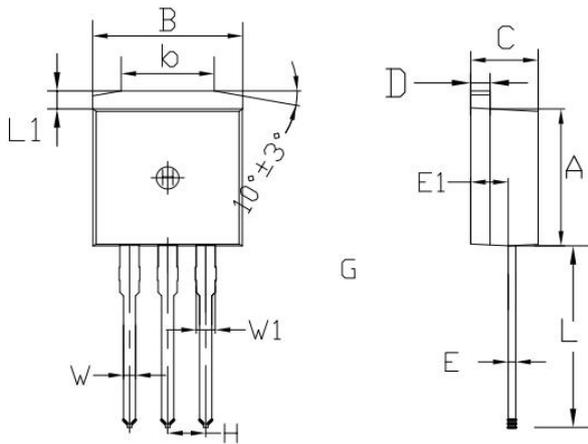
TO-220F PACKAGE OUTLINE DIMENSIONS



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

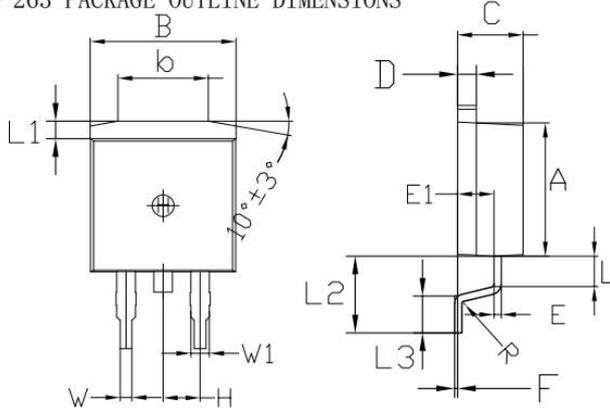
9 Dimensions(continues)

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
2021.07.12	1.0	Original	