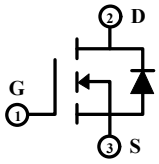
110A 85V N-channel Enhancement Mode Power MOSFET

1 Description

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



V_{DS} = 85V

$R_{DS(on)\ (TYP)}$=5.5mΩ

I_D = 110A

2 Features

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

TO-220C

TO-263

TO-3P

TO-247

3 Applications

- Synchronous rectification in SMPS
- Hard switching and high speed circuit
- Power tools
- UPS
- Motor control

4 Electrical Characteristics

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

Parameter		Symbol	Rating				Units
			DHS055 N85	DHS055 N85E	DHS055 N85D	DHS055 N85B	
Drian-to-Source Voltage		V_{DSS}	85				V
Gate-to-Source Voltage		V_{GSS}	±20				V
Continuous Drain Current	T_C=25℃	I_D	110				A
	T_C=100℃		70				A
Pulsed Drain Current(1)		I_{DM}	440				A
Single Pulse Avalanche Energy(4)		E_{AS}	145				mJ
Power Dissipation	T_a=25℃	P_{tot}	2	2	3	3	W
	T_c=25℃	P_{tot}	157	157	157	157	W
Junction Temperature Range		T_j	-55～150				℃
Storage Temperature Range		T_{stg}	-55～150				℃
Maximum Temperature for soldering		T_L	300				℃

4.2 Thermal Characteristics

Parameter	Symbol	Rating				Unit
		DHS055 N85	DHS055 N85E	DHS055 N85D	DHS055 N85B	
Thermal Resistance,Junction to Case-sink	R_{thJC}	0.8	0.8	0.8	0.8	℃/W
Thermal Resistance,Junction to Ambient	R_{thJA}	62.5	62.5	41.7	41.7	℃/W

4.3 Electrical Characteristics （Tc=25℃,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		85	--	--	V
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=85V,V_{GS}=0V,T_C=25℃		--	--	1	μA
		V_{DS}=68V,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	--	4	V
Drain-to-Source on-state Resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=50A	TO-220	--	5.5	7	mΩ
			TO--263	--	5.2	7	
			TO-3P	--	5.3	7	
			TO-247	--	5.3	7	
Forward Transfer Conductance	g_{fs}	V_{DS}=10V,I_D=50A		--	45	--	S
Dynamic Characteristics							
Input Capacitance	C_{iss}	V_{GS}=0V,V_{DS}=40V,f=1.0MHz		--	3840	--	pF
Output Capacitance	C_{oss}			--	652	--	
Reverse Transfer Capacitance	C_{rss}			--	34	--	
Gate Resisitance	R_G	V_{DD}=0V,V_{GS}=0V,F=1MHz		--	2.5	--	Ω
Switching Characteristics							
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=40V, I_D=50A, V_{GS}=10V, R_L=3Ω		--	16	--	nS
Turn-on Rise Time	t_r			--	33	--	
Turn-off Delay Time	$t_{d(off)}$			--	24	--	
Turn-off Fall Time	t_f			--	15	--	
Total Gate Charge	Q_g	I_D=50A,V_{DS}=40V,V_{GS}=10V		--	59	--	nC
Gate-to-Source Charge	Q_{gs}			--	17	--	
Gate-to-Drain(“Miller”) Charge	Q_{gd}			--	12	--	
Drain-Source Diode Characteristics							
Diode Forward Voltage(3)	V_{SD}	V_{GS}=0V,I_S=50A		--	0.9	1.2	V
Diode Forward Current	I_S			--	--	110	A
Reverse Recovery Time(3)	t_{rr}	T_J=25℃,I_F=50A, dI_F/dt=100A/μS,V_{GS}=0V		--	64	--	nS
Reverse Recovery Charge(3)	Q_{rr}			--	153	--	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=1.0mH,I_D=17A,V_{DD}=50V,VGS=10V,R=25Ω,V_{GATE}=80V,Start T_J=25℃.

5 Typical characteristics diagrams

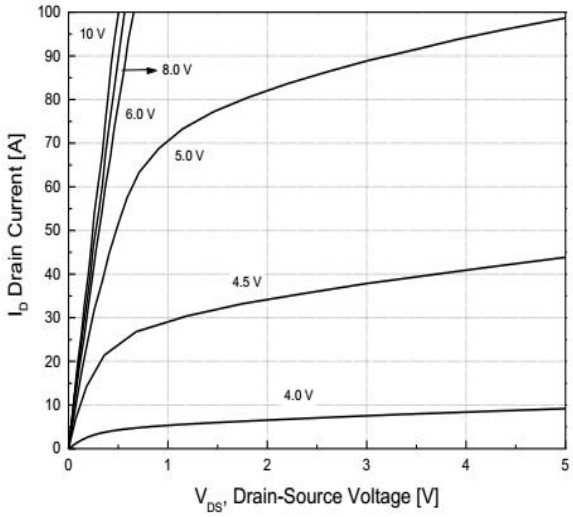


Fig.1 On-Region Characteristics

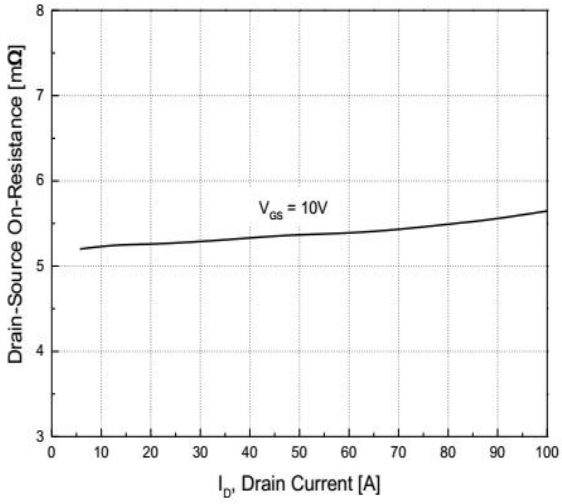


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

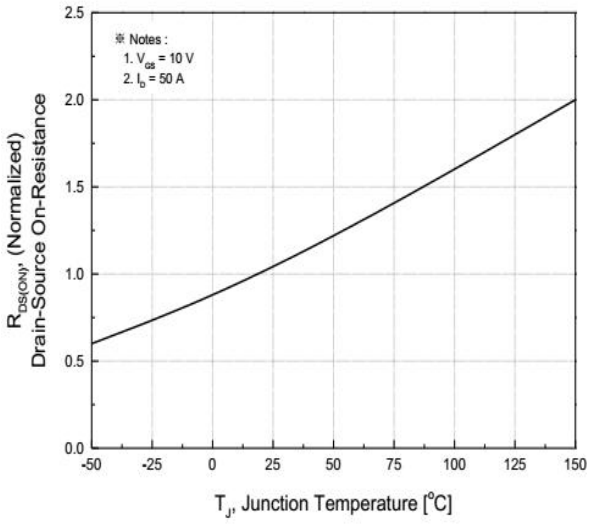


Fig.3 On-Resistance Variation with Temperature

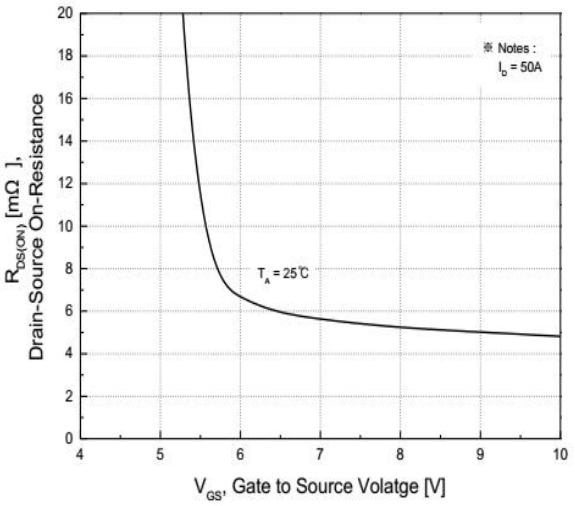


Fig.4 On-Resistance Variation with Gate to Source Voltage

5 Typical characteristics diagrams(continues)

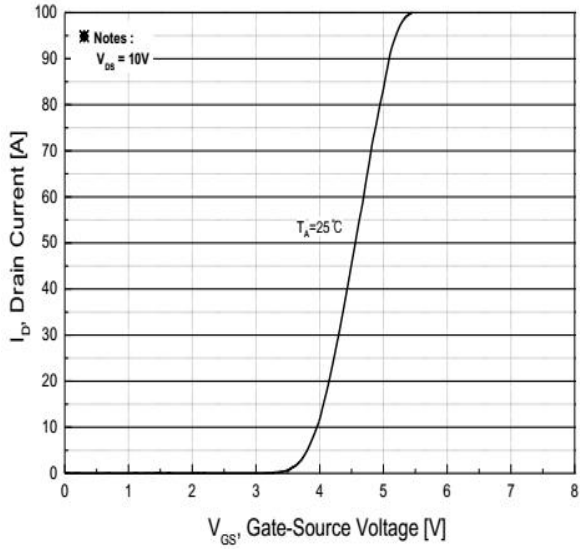


Fig.5 Transfer Characteristics

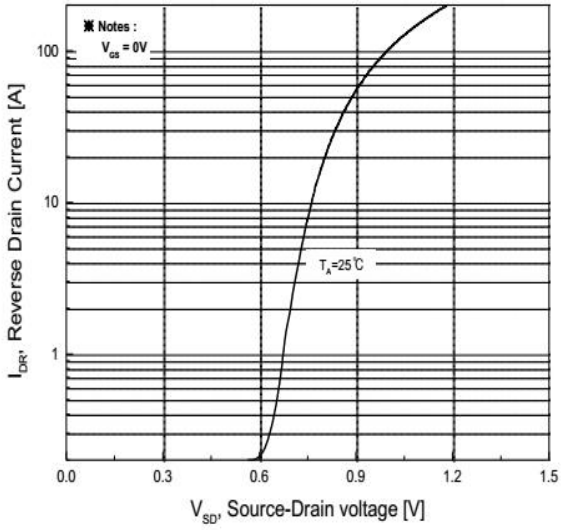


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

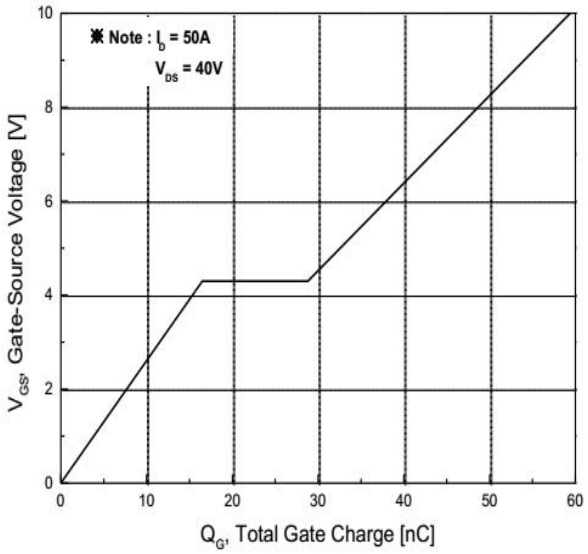


Fig.7 Gate Charge Characteristics

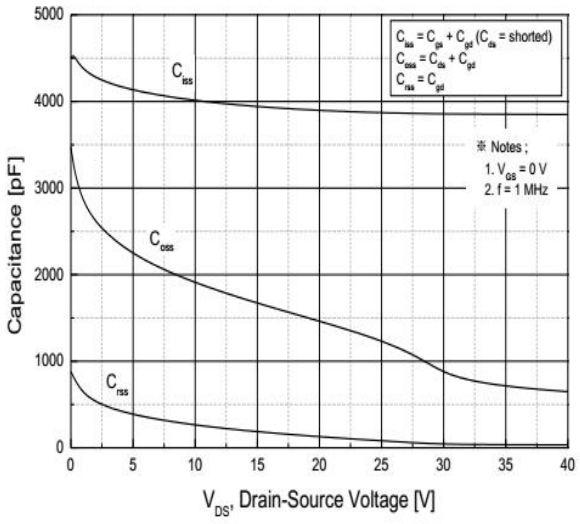


Fig.8 Capacitance Characteristics

5 Typical characteristics diagrams(continues)

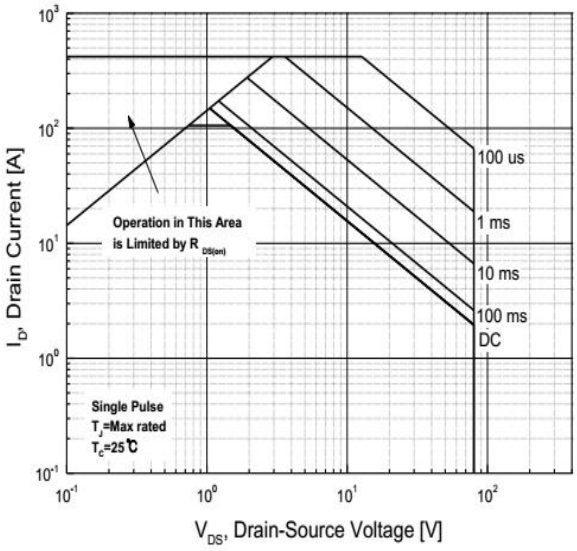


Fig.9 Maximum Safe Operating Area

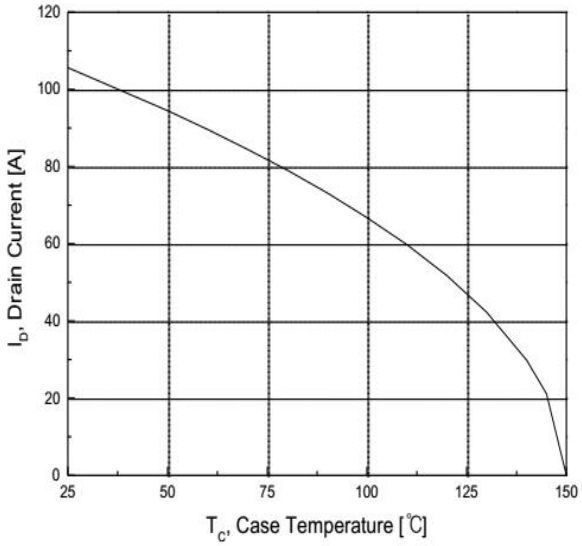


Fig.10 Maximum Drain Current vs. Case Temperature

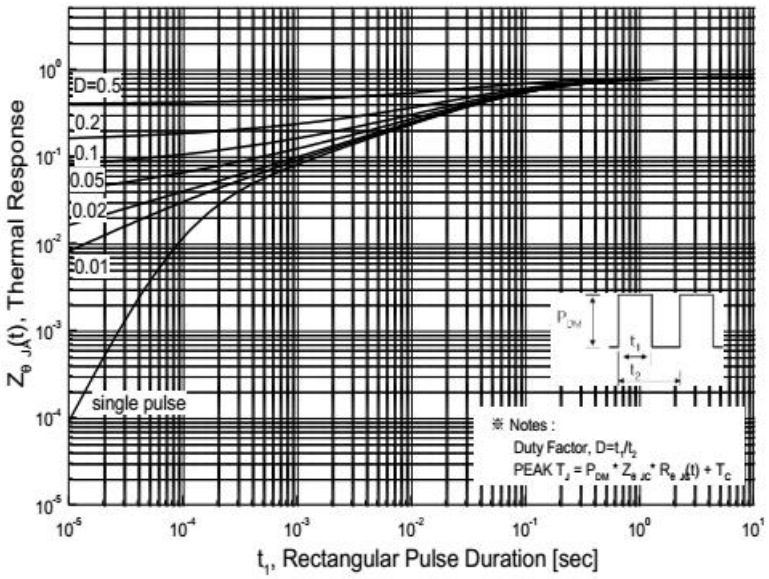
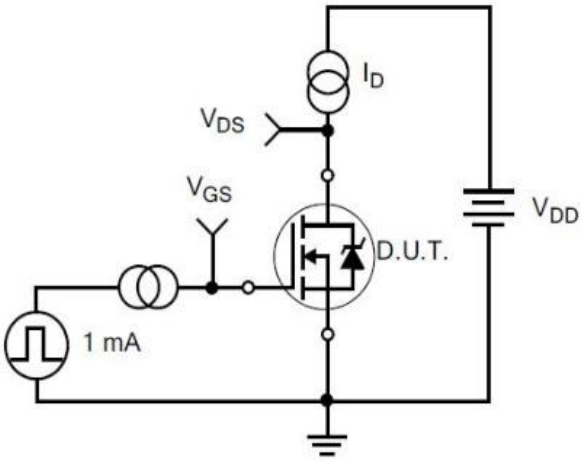
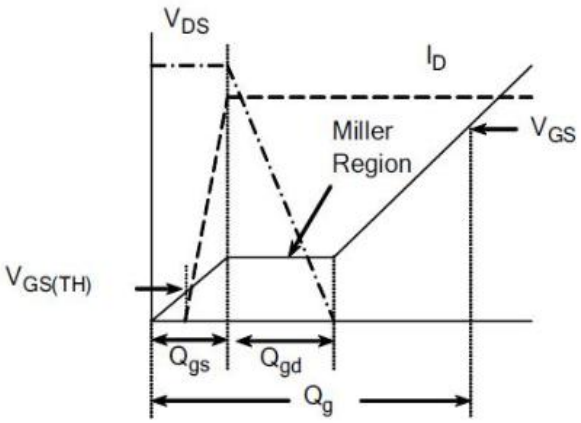


Fig.11 Transient Thermal Response Curve

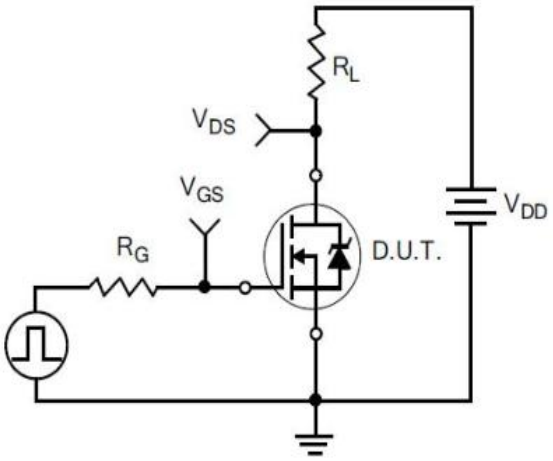
6 Typical Test Circuit and Waveform



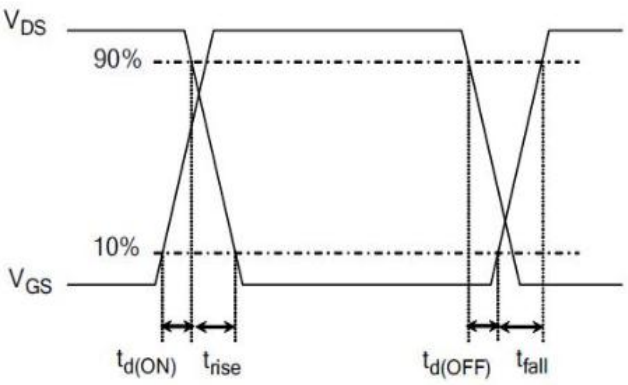
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

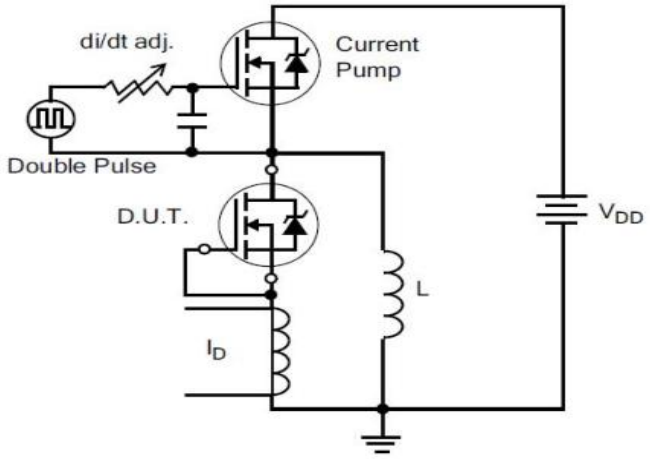


3) Resistive Switching Test Circuit

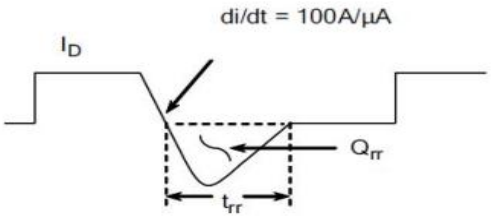


4) Resistive Switching Waveforms

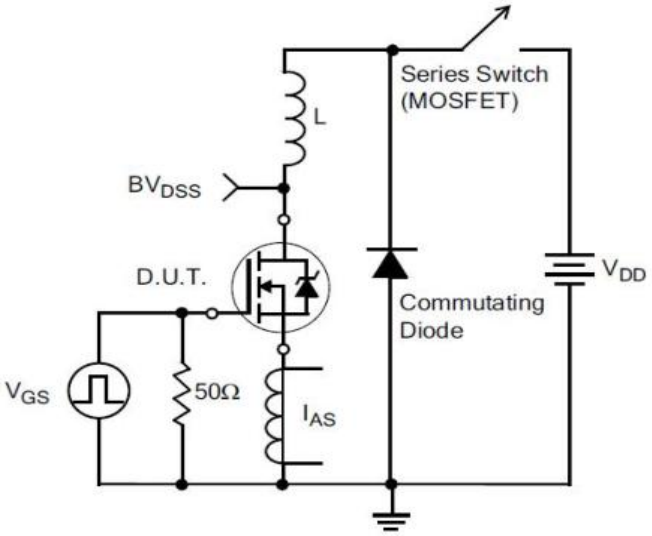
6 Typical Test Circuit and Waveform(continues)



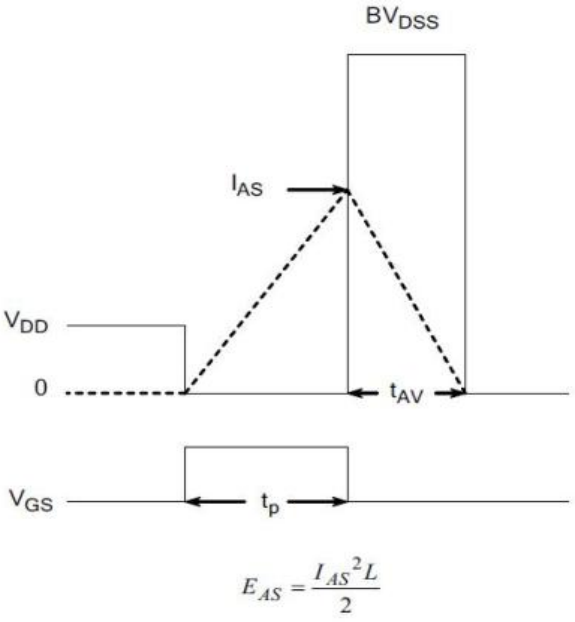
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

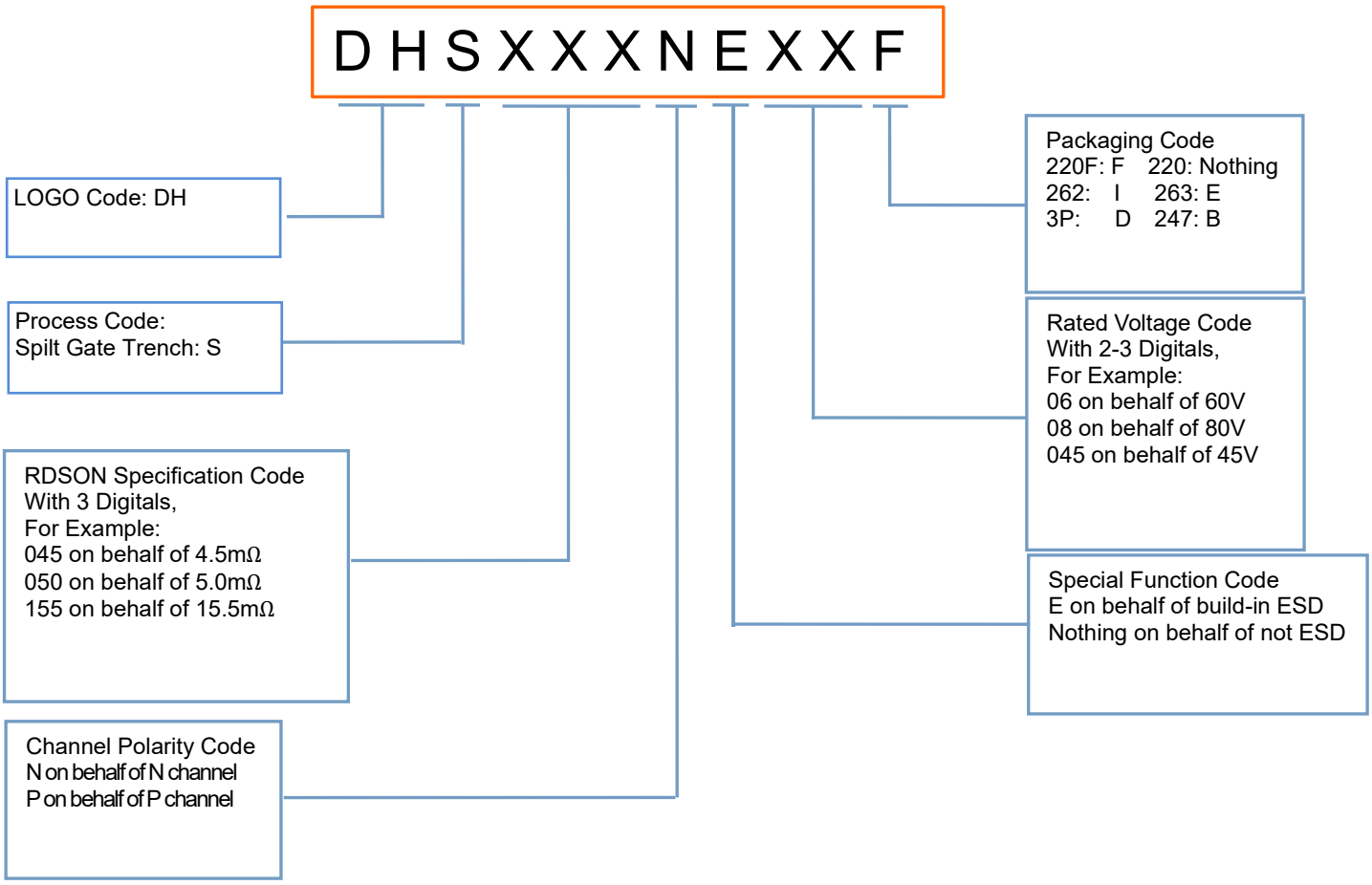


7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

7 Product Names Rules

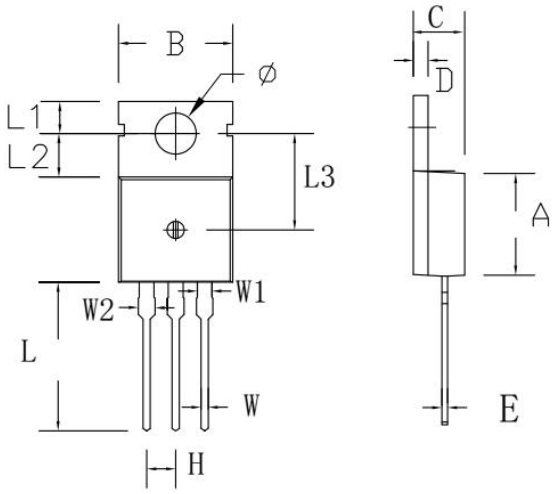


8 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	RoHS	Package	Quantity
DHS055N85	TO-220	DHS055N85	Pb-free	Tube	1000/box
DHS055N85E	TO-263	DHS055N85E	Pb-free	Tape & Reel	800/box
DHS055N85D	TO-3P	DHS055N85D	Pb-free	Tube	300/box
DHS055N85B	TO-247	DHS055N85B	Pb-free	Tube	300/box

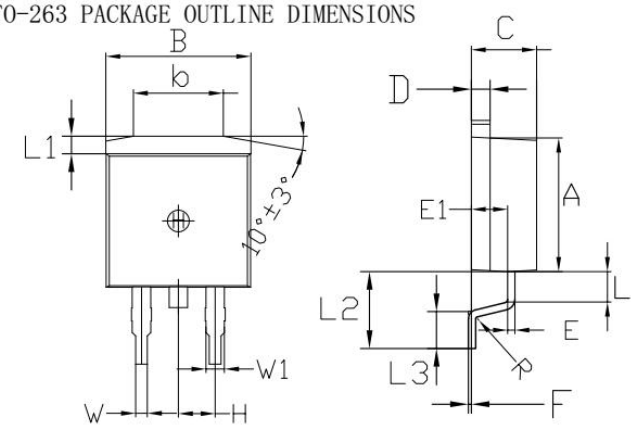
9 Dimensions

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

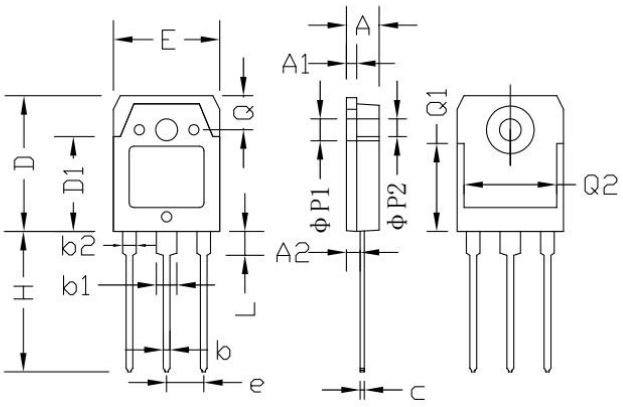
TO-263 PACKAGE OUTLINE DIMENSIONS



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

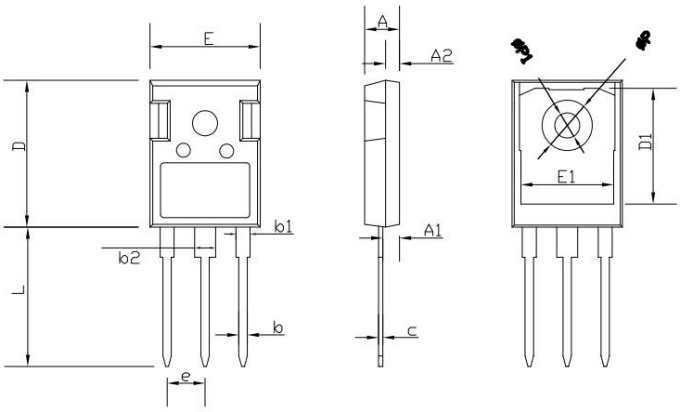
9 Dimensions(continues)

TO-3PN PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	4.60	5.00	0.181	0.197
A1	1.45	1.65	0.057	0.065
A2	2.20	2.60	0.087	0.102
b	0.80	1.20	0.032	0.047
b1	2.80	3.20	0.110	0.126
b2	1.80	2.20	0.071	0.087
C	0.55	0.75	0.022	0.030
D	19.20	19.70	0.756	0.776
D1	13.10	14.70	0.516	0.578
E	15.40	15.80	0.607	0.623
e	5.45 TYP		0.215 TYP	
H	19.80	20.20	0.780	0.826
L	3.30	3.70	0.130	0.146
ΦP1	3.20 TYP		0.126 TYP	
ΦP2	3.50 TYP		0.138 TYP	
Q	5.00 TYP		0.197 TYP	
Q1	12.40 TYP		0.488 TYP	
Q2	12.6	-	0.496	-

TO-247 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	4.90	5.10	0.193	0.201
A1	2.31	2.51	0.091	0.099
A2	1.90	2.10	0.075	0.083
b	1.16	1.26	0.046	0.050
b1	1.96	2.06	0.0772	0.0812
b2	2.96	3.06	0.117	0.121
c	0.59	0.66	0.0232	0.0260
D	20.90	21.10	0.8235	0.8313
D1	16.25	16.85	0.6403	0.6639
E	15.70	15.90	0.6186	0.6265
E1	13.10	13.50	0.5161	0.5319
e	5.44		0.2143	
L	19.80	20.10	0.7801	0.7919
ΦP	3.50	3.70	0.1379	0.1458
ΦP1	0	7.30	0	0.2876

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
2018.09.02	1.0	Original	