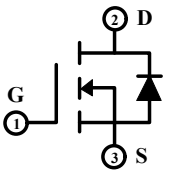
140A 40V N-channel Enhancement Mode Power MOSFET

1 Description

These N-channel enhanced vdmosfets used advanced trench technology design, provided excellent Rdson and low gate charge. Which accords with the RoHS standard.



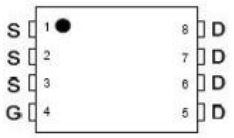
V_{DSS} = 40V

$R_{DS(on)\ (TYP)}$= 2.3mΩ

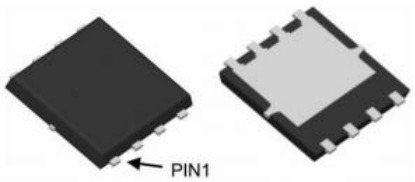
I_D = 140A

2 Features

- Fast switching
- High avalanche Current
- Low on resistance(Rdson≤3.5mΩ)
- Low gate charge(Typ: 121nC)
- Low reverse transfer capacitances(Typ: 640pF)
- 100% single pulse avalanche energy test
- 100% ΔV_{DS} test



Pin Assignment



DFN5X6-8L top&bottom view

3 Applications

- DC-DC converters
- Power supply

4 Electrical Characteristics

4.1 Absolute Maximum Rating (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℃	I_D	140	A
	T_C=100℃		98	A
Pulsed Drain Current(1)		I_{DM}	460	A
Single Pulse Avalanche Energy(4)		E_{AS}	210	mJ
Avalanche Current(4)		I_{AS}	29	A
Power Dissipation	T_a=25℃	P_{tot}	--	W
	T_C=25℃	P_{tot}	135	W
Junction Temperature Range		T_j	-55～175	℃
Storage Temperature Range		T_{stg}	-55～175	℃
Maximum Temperature for soldering		T_L	260	℃

4.2 Thermal Characteristics

Parameter	Symbol	Rating	Unit
Thermal Resistance,Junction to Case-sink	R_{thJC}	1.11	℃/W
Thermal Resistance,Junction to Ambient	R_{thJA}	--	℃/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	40	43	--	V
BV_{DSS} Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	I_D=250μA,reference 25℃	--	0.04	--	V/℃
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=40V,V_{GS}=0V,T_C=25℃	--	--	1	μA
		V_{DS}=32V,V_{GS}=0V,T_C=125℃	--	--	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	1.5	2.0	2.5	V
Drain-to-Source on-state Resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=30A	--	2.3	3.5	mΩ
		V_{GS}=4.5V,I_D=30A	--	3.0	4.2	
Forward Transfer Conductance	g_{fs}	V_{DS}=5V,I_D=20A	--	58	--	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{GS}=0V,V_{DS}=20V,f=1.0MHz	--	5900	--	pF
Output Capacitance	C_{oss}		--	690	--	
Reverse Transfer Capacitance	C_{rss}		--	640	--	
Gate Resisitance	R_G	V_{DD}=0V,V_{GS}=0V,f=1MHz	--	1.3	--	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=20V, I_D=40A, V_{GS}=10V, R_{GEN}=3Ω	--	28	--	nS
Turn-on Rise Time	t_r		--	68	--	
Turn-off Delay Time	$t_{d(off)}$		--	109	--	
Turn-off Fall Time	t_f		--	33	--	
Total Gate Charge	Q_g	I_D=40A,V_{DS}=32V,V_{GS}=10V	--	121	--	nC
Gate-to-Source Charge	Q_{gs}		--	17	--	
Gate-to-Drain(“Miller”) Charge	Q_{gd}		--	35	--	
Drain-Source Diode Characteristics						
Diode Forward Voltage(3)	V_{FSD}	V_{GS}=0V,I_S=30A	--	0.82	1.2	V
Diode Forward Current	I_S		--	--	60	A
Reverse Recovery Time(3)	t_{rr}	T_J=25℃,I_F=40A, dI_F/dt=100A/μS,V_{GS}=0V	--	39	--	nS
Reverse Recovery Charge(3)	Q_{rr}		--	41	--	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,I_D=29A,V_{DD}=25V,V_{GATE}=30V,Start T_J=25℃.

5 Typical characteristics diagrams

Figure 1. Typ. Output Characteristics

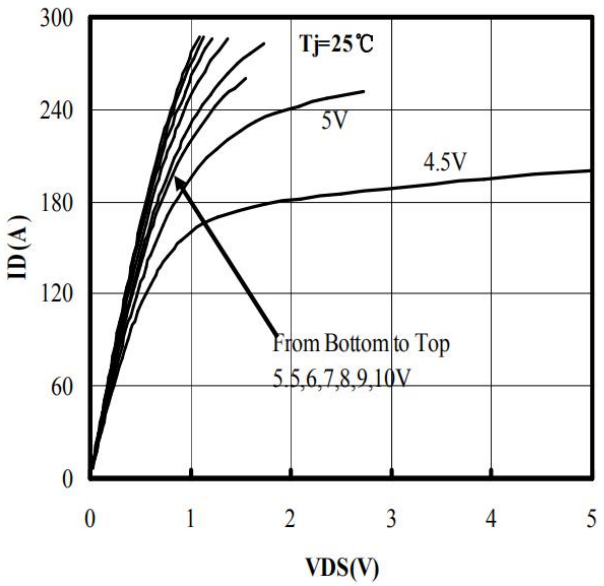


Figure 2. Typ. Output Characteristics

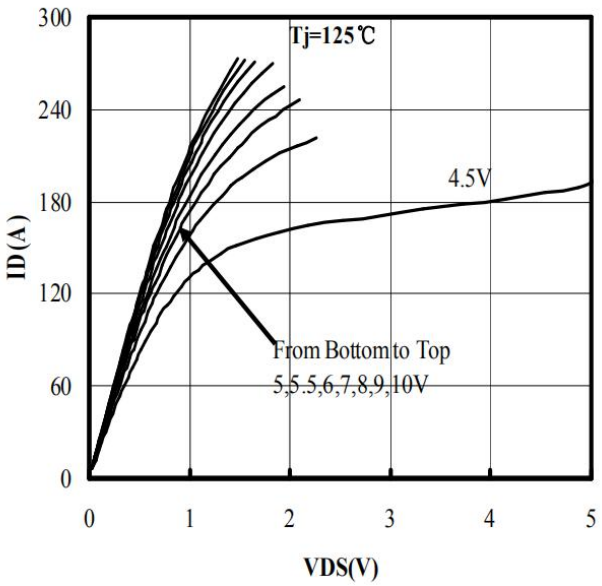


Figure 3. Transfer Characteristics

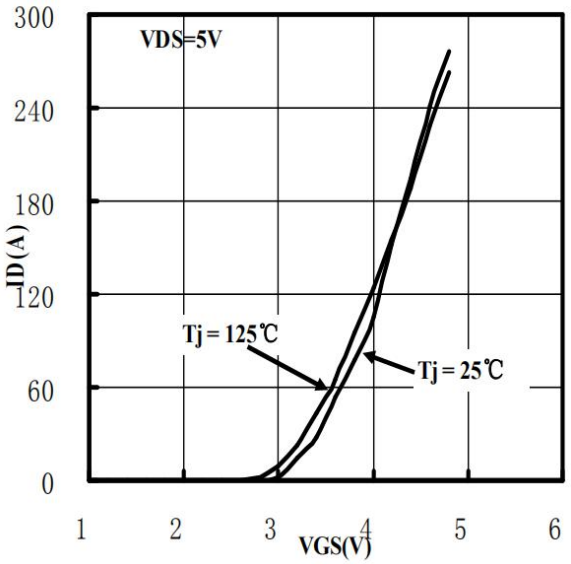
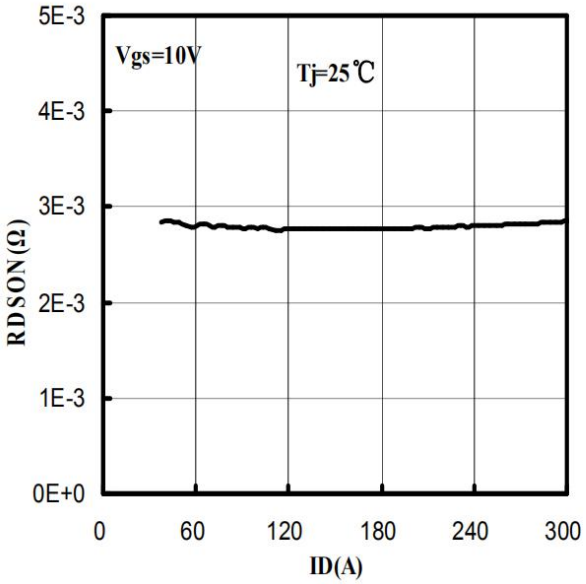


Figure 4. Rdson vs. Drain Current Characteristics



5 Typical characteristics diagrams(continues)

Figure 5. Gate Threshold Voltage Characteristics

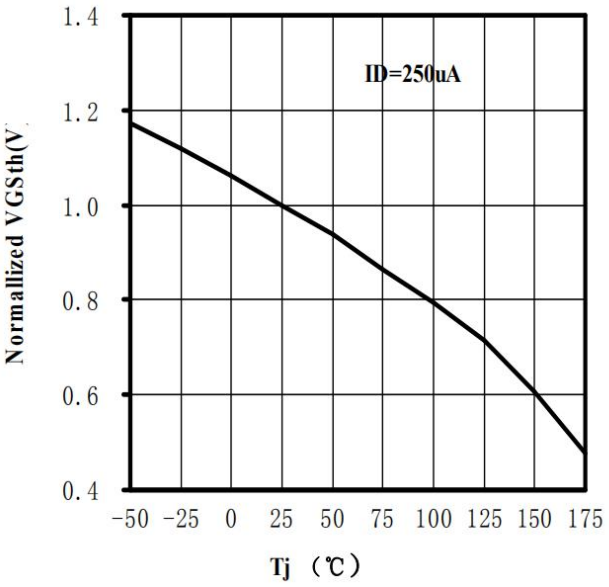


Figure 6. Rdson vs. Junction Tem Characteristics

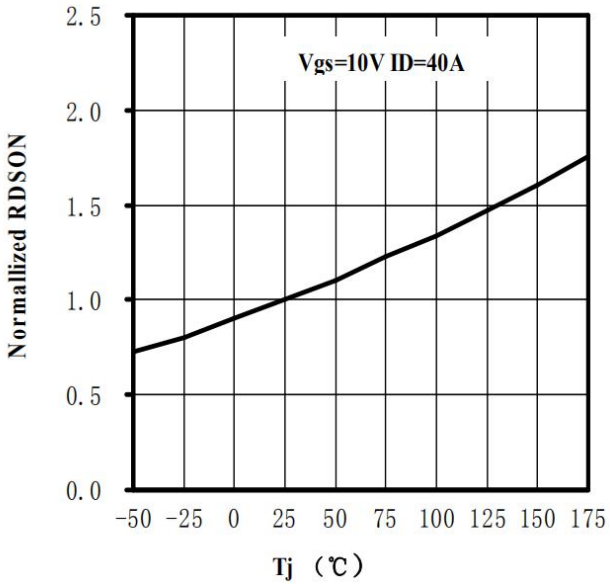


Figure 7. Rdson vs. VGS Characteristics

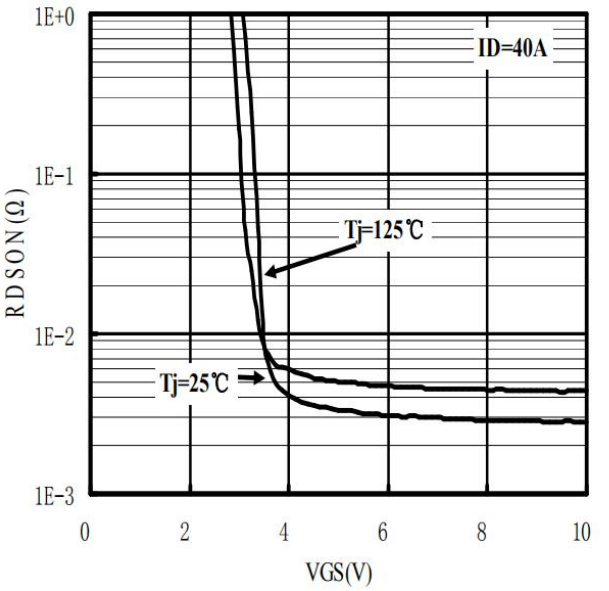
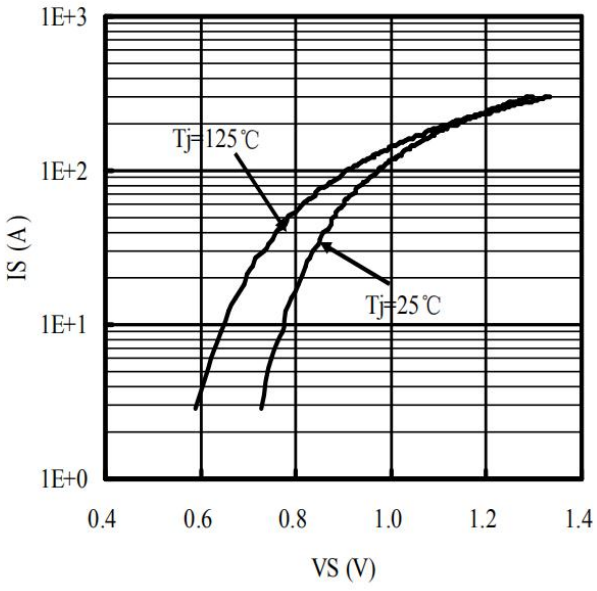


Figure 8. IS vs. VSD Characteristics



5 Typical characteristics diagrams(continues)

Figure 9. Gate Charge Characteristics

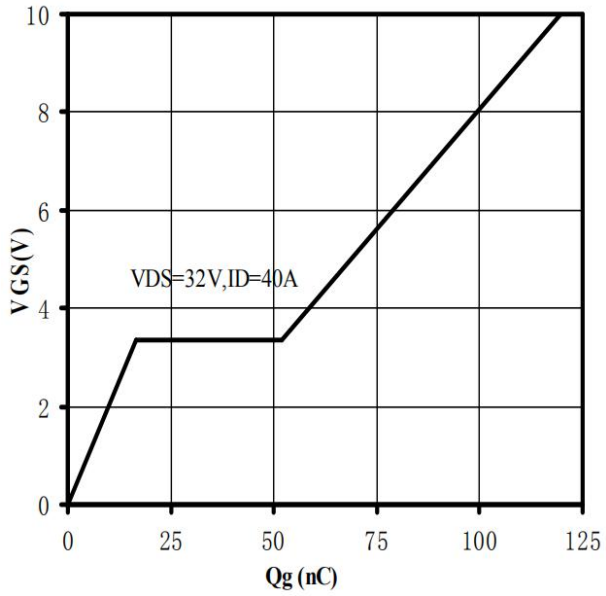


Figure 10. Capacitance Characteristics

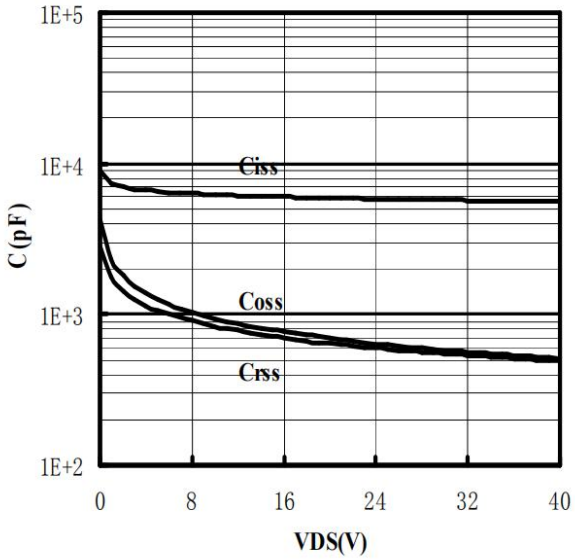


Figure 11. Thermal Resistance Characteristics

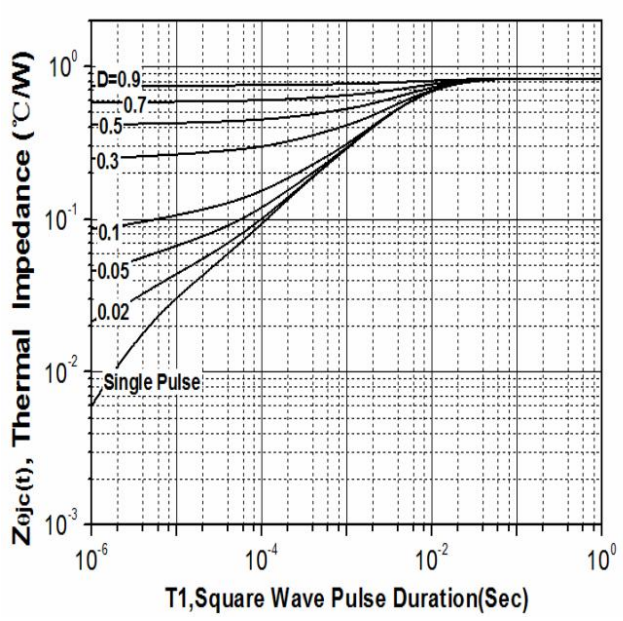
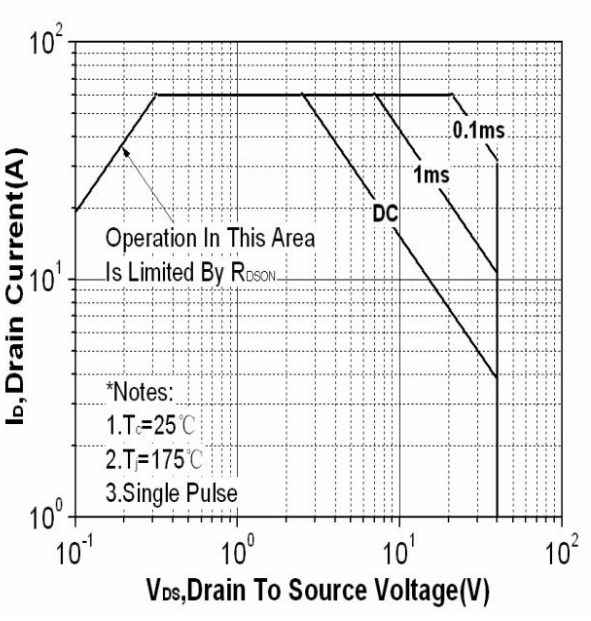
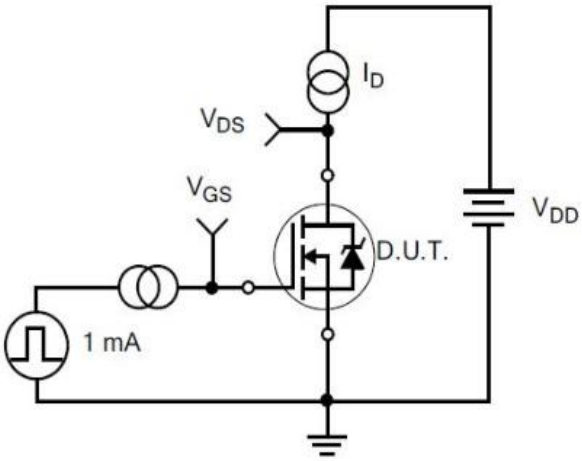


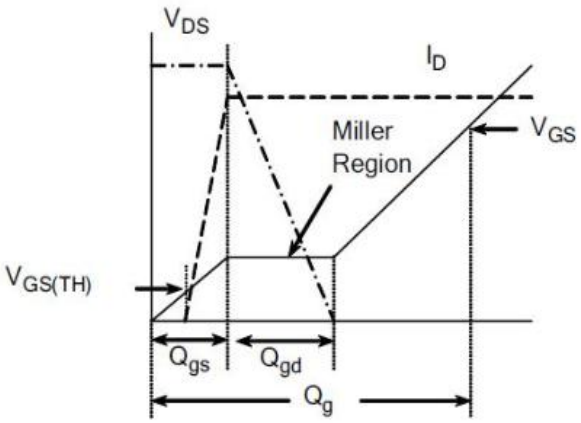
Figure 12. Safe Operating Area



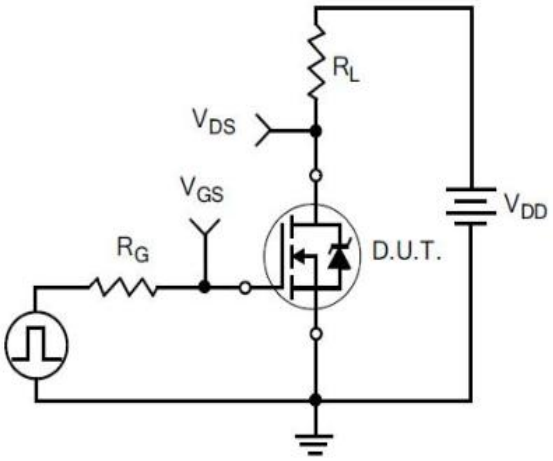
6 Typical Test Circuit and Waveform



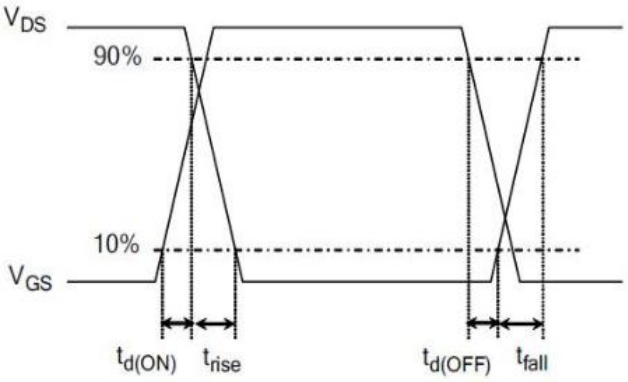
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

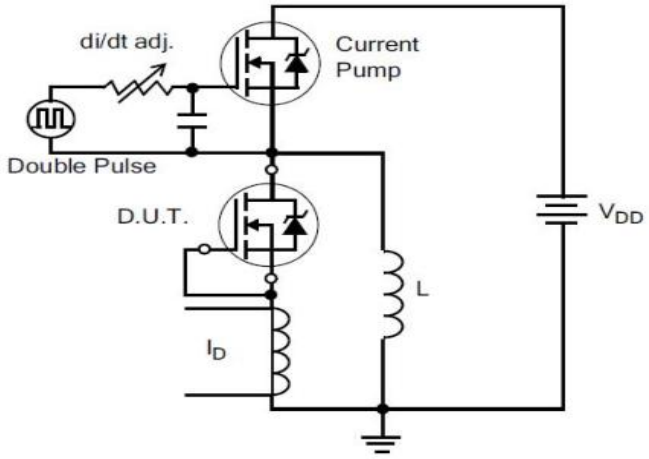


3) Resistive Switching Test Circuit

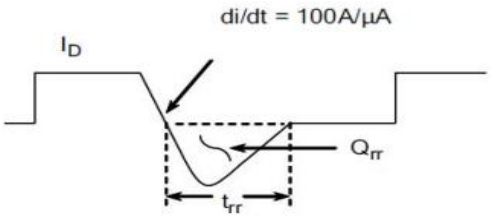


4) Resistive Switching Waveforms

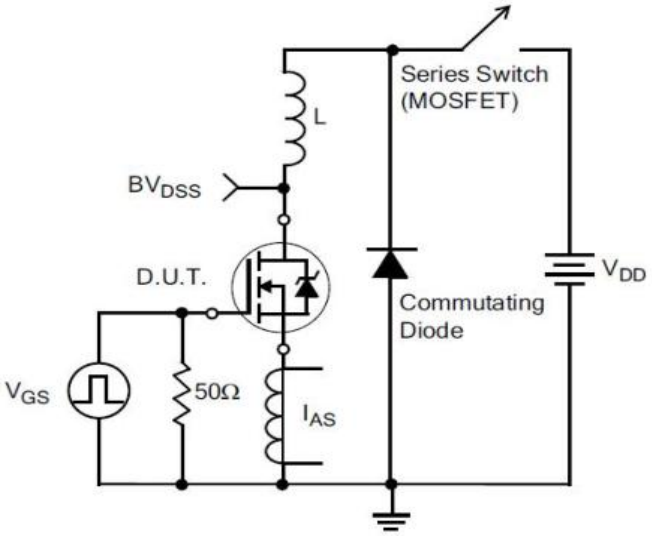
6 Typical Test Circuit and Waveform(continues)



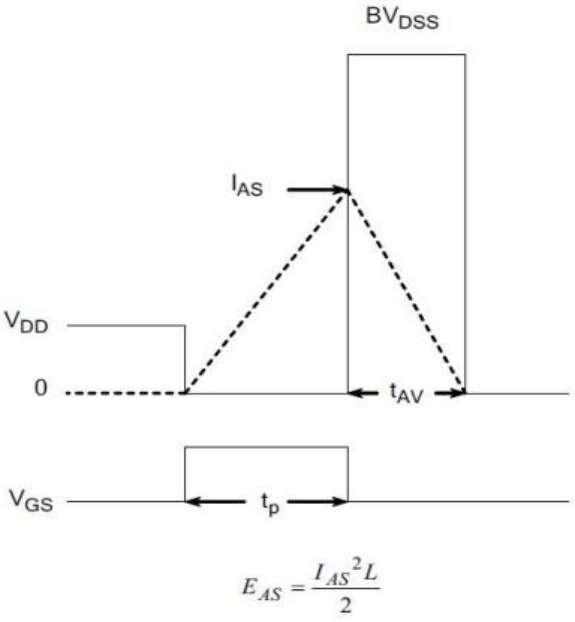
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

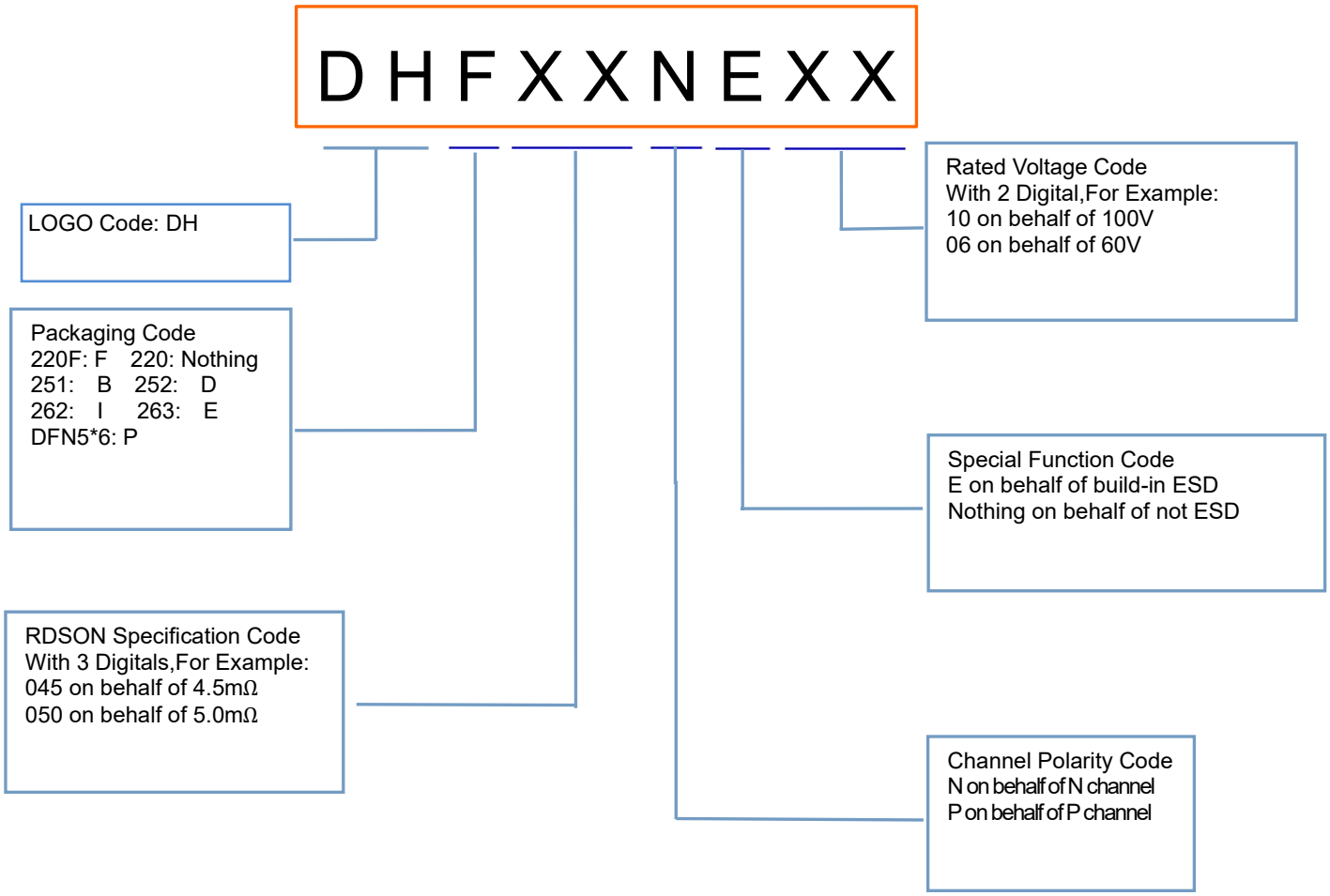


7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

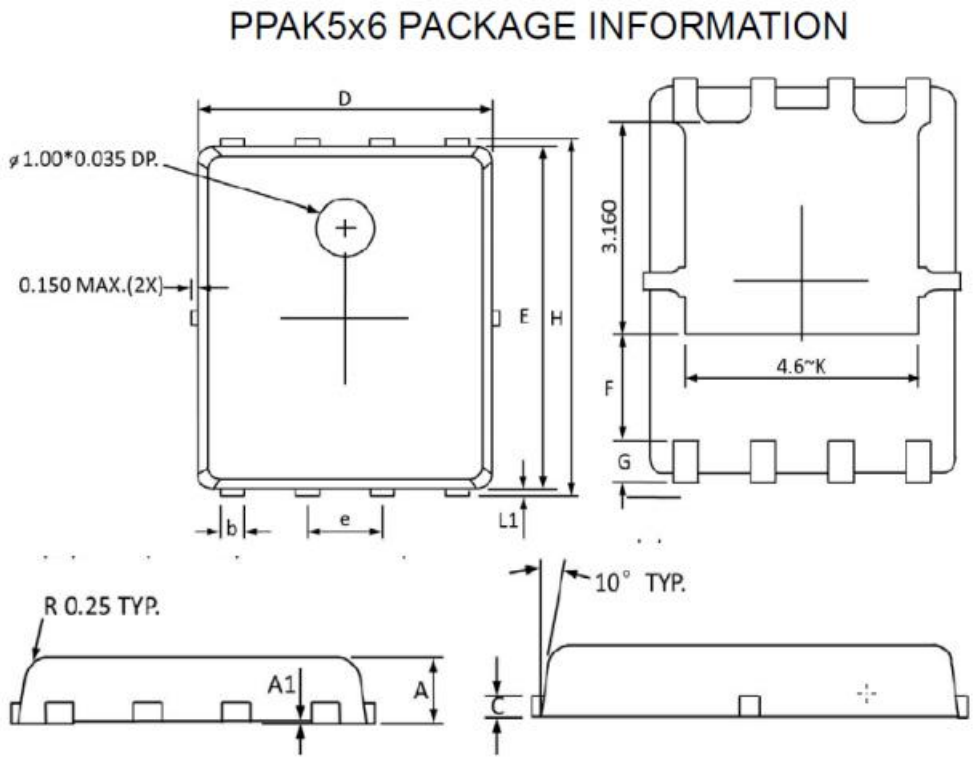
7 Product Names Rules



8 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	RoHS	Package	Quantity
DHP035N04	P PAK5*6	DHP035N04	Pb-free	Tape & Reel	3000/box

9 Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.000	0.032	0.039
A1	0.000	0.005	0.000	0.000
b	0.350	0.490	0.014	0.019
C	0.254 Ref		0.254 Ref	
D	4.900	5.100	0.193	0.200
E	5.700	5.900	0.225	0.232
e	1.27 BSC		1.27 BSC	
F	1.600 Ref		1.600 Ref	
G	0.600 Ref		0.600 Ref	
H	5.950	6.200	0.235	0.244
L1	0.100	0.180	0.004	0.007
K	3.200 Ref		3.200 Ref	

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
2019.01.08	1.0	Original	