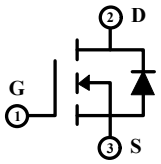
42A 600V N-channel Super Junction Power MOSFET

1 Description

These N-channel enhanced vdmosfets, is using advanced super junction technology and design to provide excellent Rdson with low gate charge. Which accords with the RoHS standard.



V_{DSS} = 600V

$R_{DS(on)\ (TYP)}$= 61mΩ

I_D = 42A

TO-247

2 Features

- Fast Recovery Time
- Low on resistance
- Low gate charge
- Low reverse transfer capacitances
- Built-in ESD Diode
- 100% single pulse avalanche energy test
- 100% ΔV_{DS} test

3 Applications

- Power factor correction(PFC).
- Switched mode power supplies(SMPS).
- Uninterruptible power supply(UPS).
- AC to DC Converters
- Telecom，Solar

4 Electrical Characteristics

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

Parameter		Symbol	Rating	Units
Drian-to-Source Voltage		V_{DSS}	600	V
Gate-to-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current	T_C=25℃	I_D	42	A
	T_C=100℃		27	A
Pulsed Drain Current(1)		I_{DM}	128	A
Single Pulse Avalanche Energy(4)		E_{AS}	810	mJ
Repetitive Avalanche Current(4)		I_{AR}	4.2	A
MOSFET dv/dt ruggedness, V_{DS}=0…400V		dv/dt	50	V/ns
Reverse diode dv/dt, V_{DS}=0…400V, I_{DS}≤I_D		dv/dt	15	V/ns
Power Dissipation	T_a=25℃	P_{tot}	2	W
	T_C=25℃	P_{tot}	272	W
Junction Temperature Range		T_j	-55～150	℃
Storage Temperature Range		T_{stg}	-55～150	℃

4.2 Thermal Characteristics

Parameter	Symbol	Rating	Unit
Thermal Resistance,Junction to Case-sink	R_{thJC}	0.46	℃/W
Thermal Resistance,Junction to Ambient	R_{thJA}	62.5	℃/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=1mA,V_{GS}=0V	600	--	--	V
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=600V,V_{GS}=0V,T_C=25℃	--	--	5	μA
		V_{DS}=600V,V_{GS}=0V,T_C=150℃	--	500	--	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±20V	--	--	±1	μA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=1.0mA	2.5	--	5	V
Drain-to-Source on-state Resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=20A	--	61	70	mΩ
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=400V, f=1.0MHz	--	4670	--	pF
Output Capacitance	C_{oss}		--	96	--	
Reverse Transfer Capacitance	C_{rss}		--	3.5	--	
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	I_D=25A, V_{DD}=300V, V_{GS}=10V, R_G=25Ω	--	80	--	nS
Turn-on Rise Time	t_r		--	35	--	
Turn-off Delay Time	$t_{d(off)}$		--	350	--	
Turn-off Fall Time	t_f		--	23	--	
Total Gate Charge	Q_g	I_D=25A, V_{DD}=480V, V_{GS}=10V	--	105	--	nC
Gate-to-Source Charge	Q_{gs}		--	20	--	
Gate-to-Drain(“Miller”) Charge	Q_{gd}		--	30	--	
Drain-Source Diode Characteristics						
Diode Forward Voltage(3)	V_{FSD}	V_{GS}=0V,I_S=25A	--	--	1.2	V
Diode Forward Current	I_S		--	--	42	A
Reverse Recovery Time(3)	t_{rr}	T_J=25℃,I_F=25A, dI_F/dt=100A/μS,V_R=400V	--	170	--	nS
Reverse Recovery Charge(3)	Q_{rr}		--	1200	--	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=10mH,I_D=4.2A,V_{DD}=100V,V_{GS}=10V,R_G=25Ω,V_{GATE}=600V,Start T_J=25℃.

5 Typical characteristics diagrams

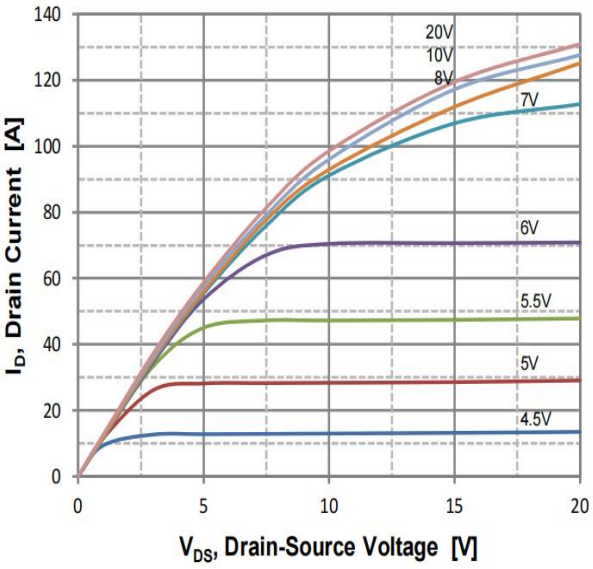


Figure 1. On Region Characteristics

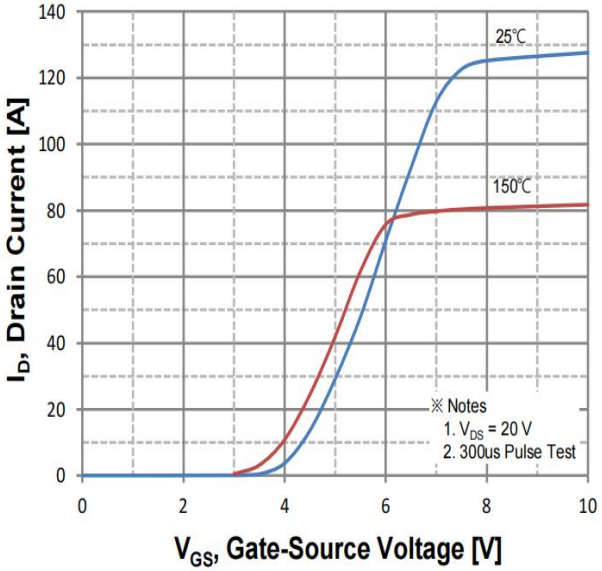


Figure 2. Transfer Characteristics

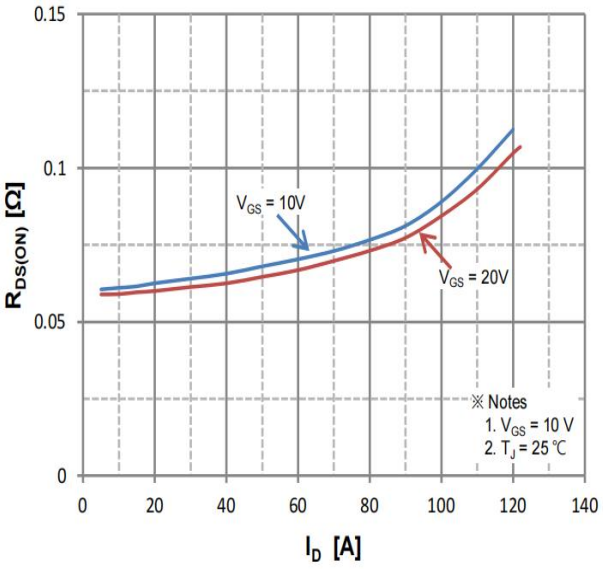


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

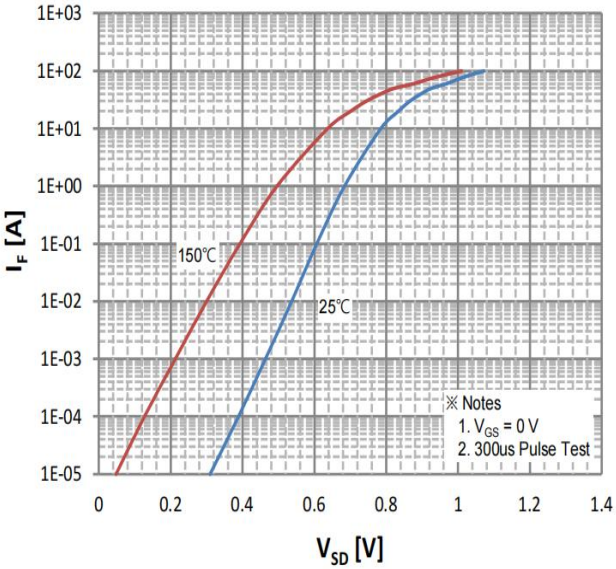


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

5 Typical characteristics diagrams(continues)

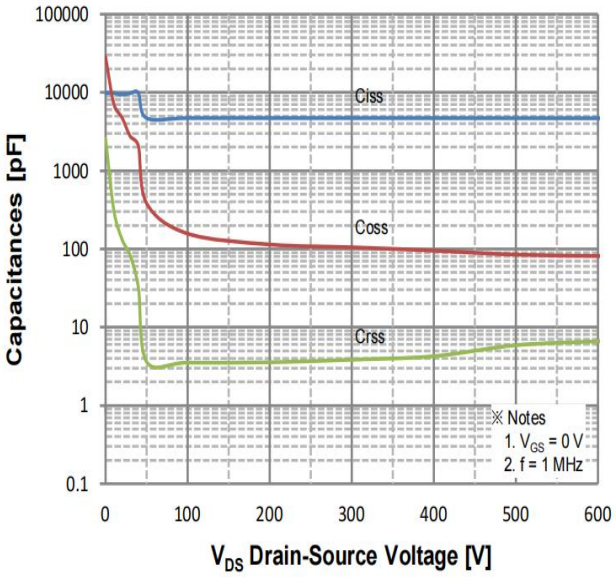


Figure 5. Capacitance Characteristics

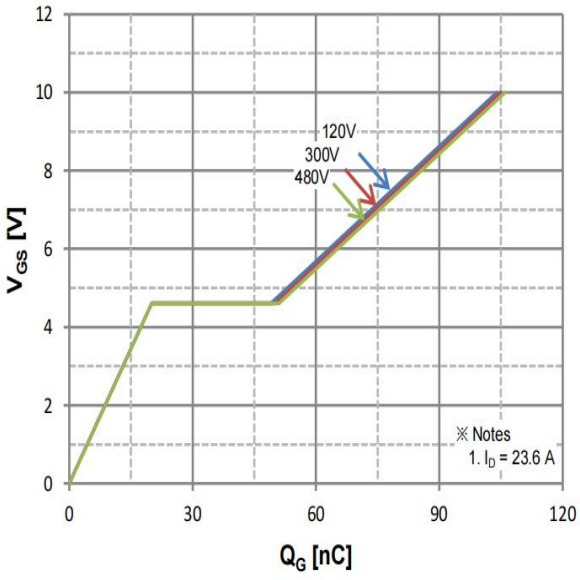


Figure 6. Gate Charge Characteristics

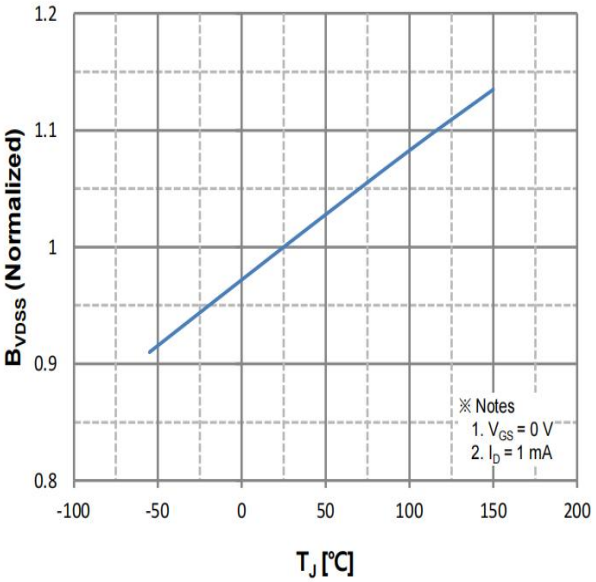


Figure 7. Breakdown Voltage Variation vs. Temperature

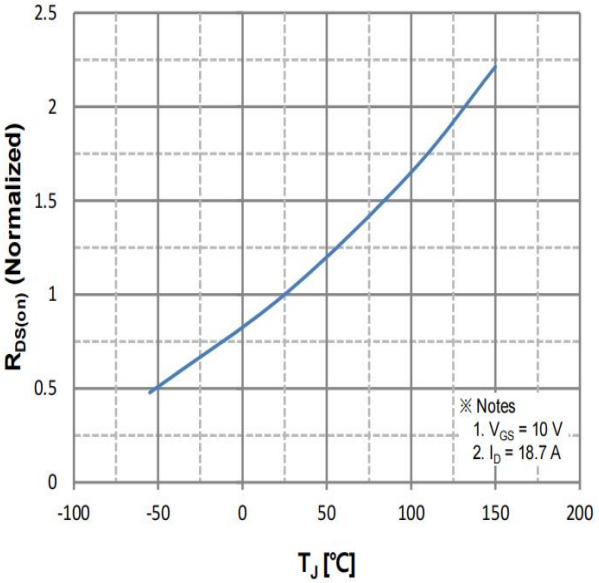


Figure 8. On-Resistance Variation vs. Temperature

5 Typical characteristics diagrams(continues)

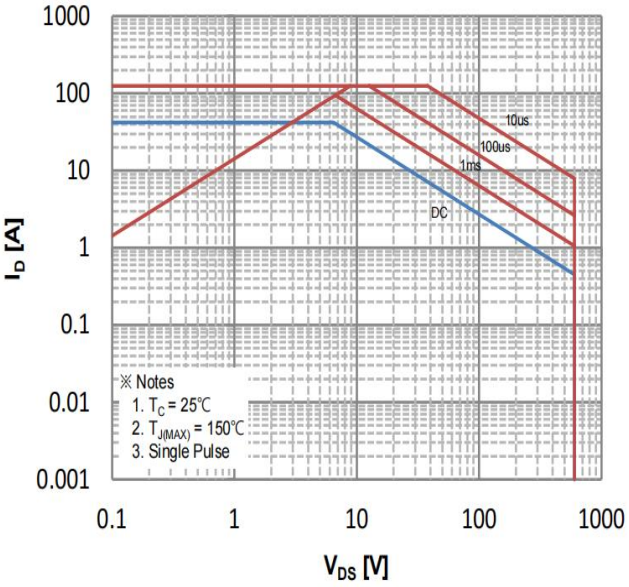


Figure 9. Maximum Safe Operating Area

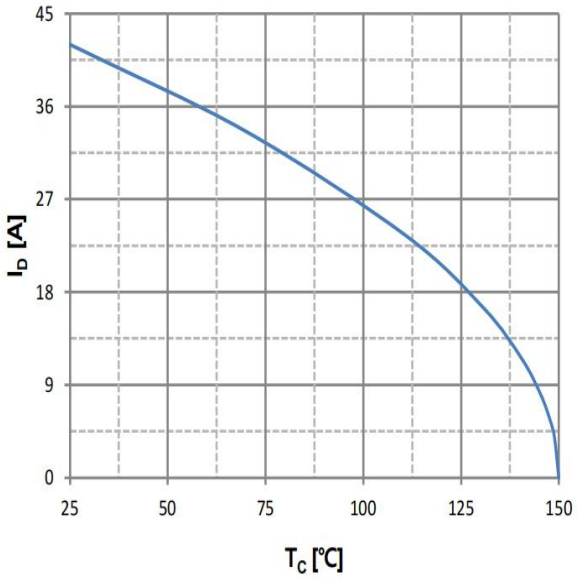


Figure 10. Maximum Drain Current vs. Case Temperature

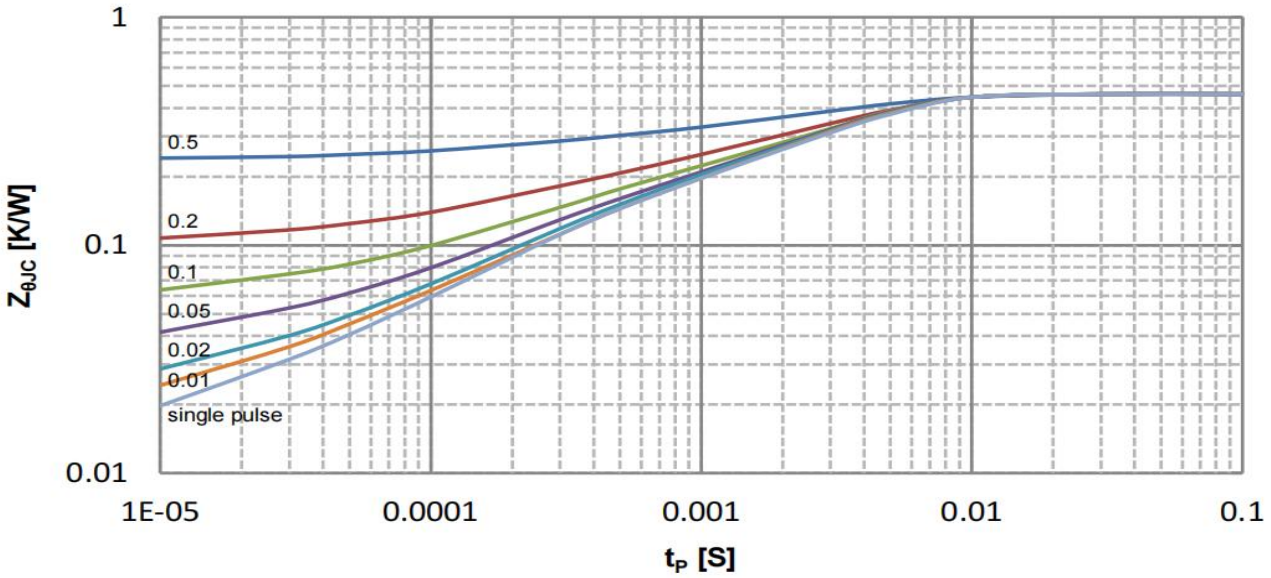
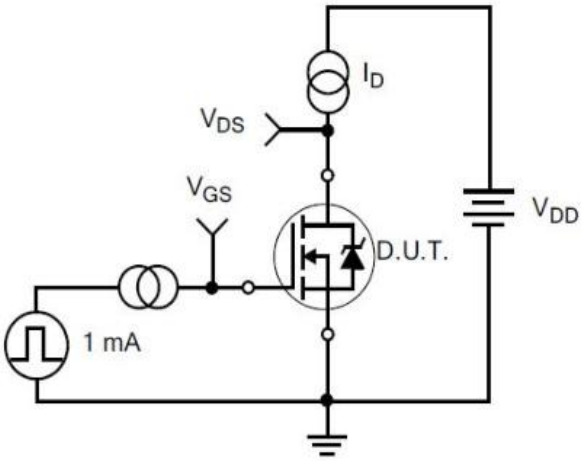
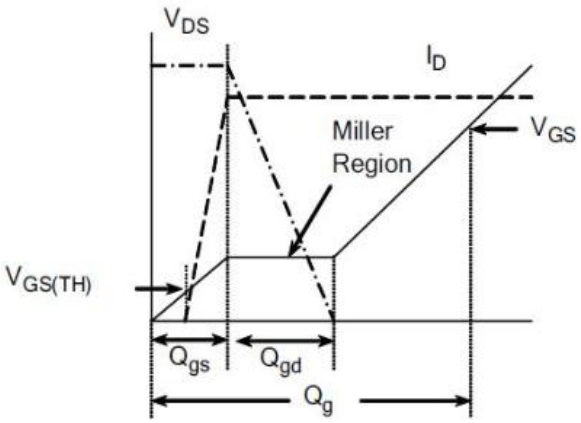


Figure 11. Transient Thermal Response Curve

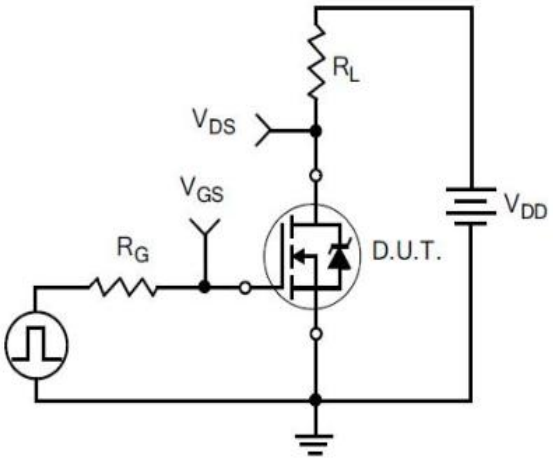
6 Typical Test Circuit and Waveform



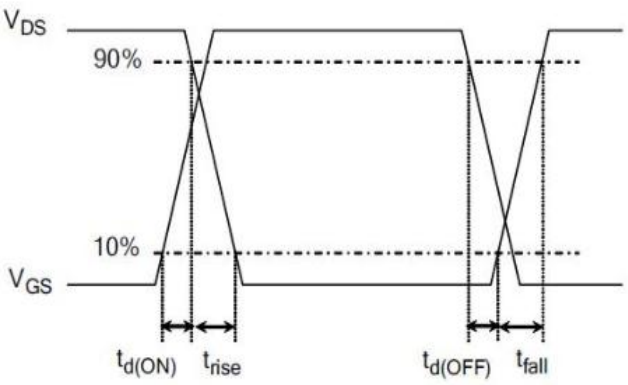
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

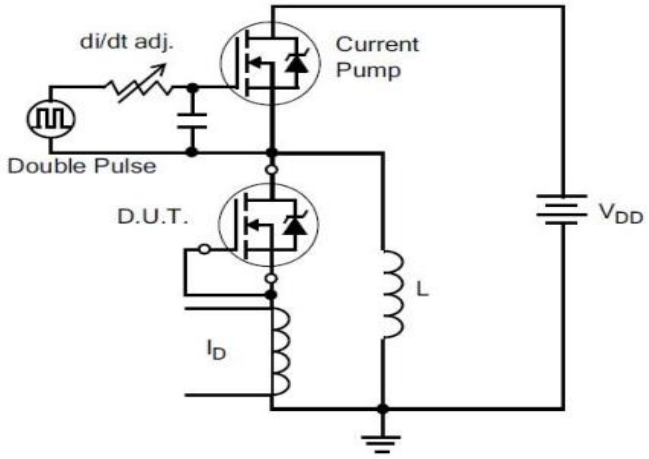


3) Resistive Switching Test Circuit

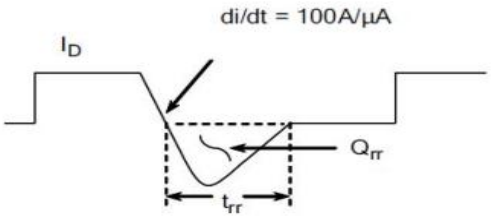


4) Resistive Switching Waveforms

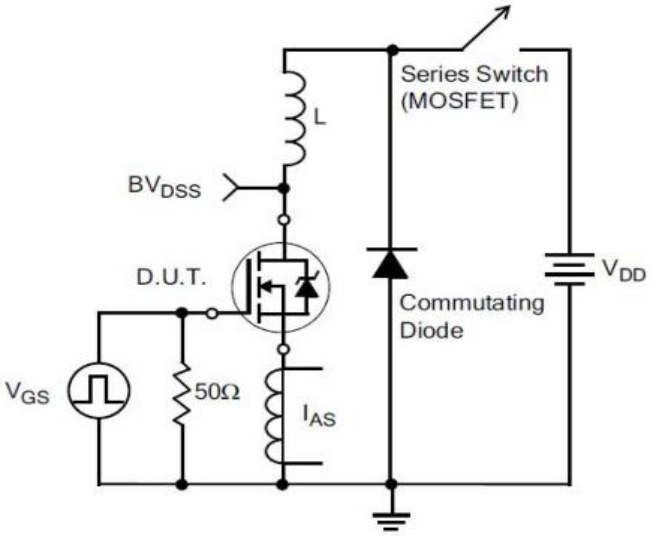
6 Typical Test Circuit and Waveform(continues)



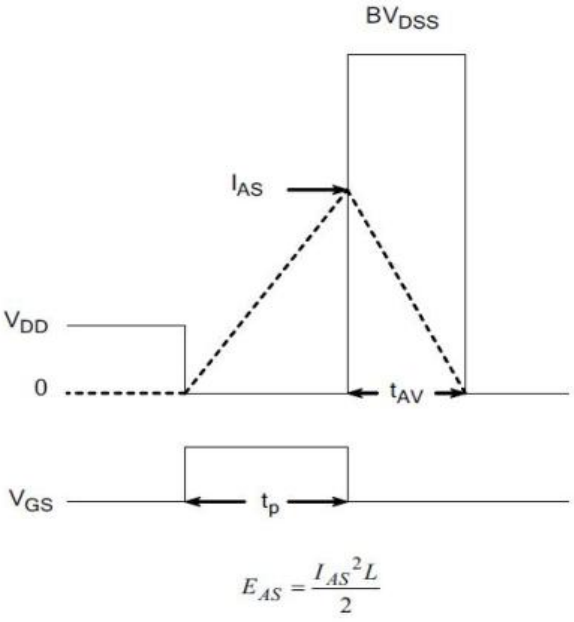
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

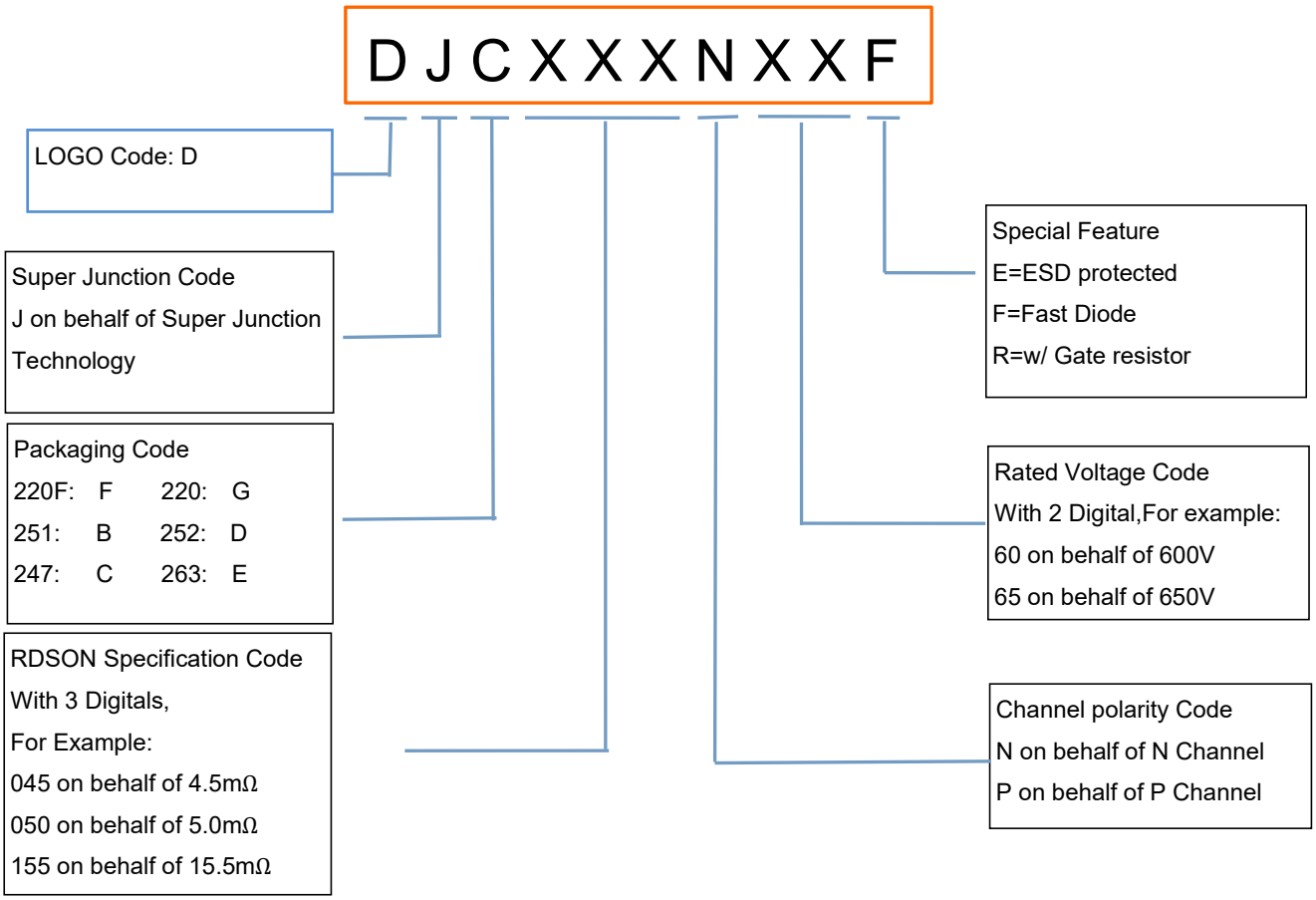


7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

7 Product Names Rules

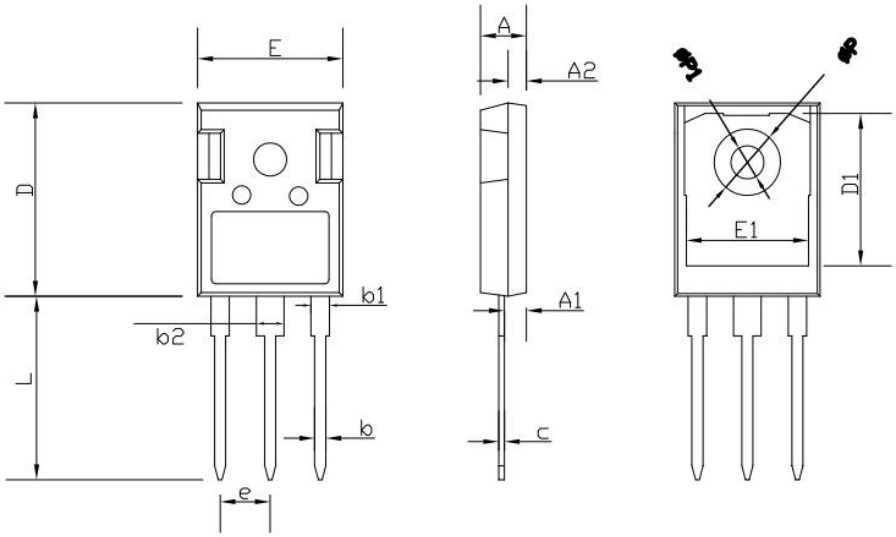


8 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	Indentification Code	RoHS	Package	Quantity
DJC070N60F	TO-247	DJC070N60F	S26	Pb-free	Tube	300/box

9 Dimensions

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
2022.09.18	1.0	Original	