SEMICONDUCTOR

D180N04-2M Series

180A 40V N-Channel Enhancement Mode Power MOSFET

Genaral Description

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

Product Summary			
V_{DS}	$R_{DS(on)}$ (mΩ) Typ	I_D (A)	Qg (Typ)
40V	2.0 @ 10V	180	59.4nc

Features

- Fast switching
- Low on-resistance
- Low gate charge and input capacitance
- 100% avalanche tested

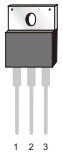
Mechanical Data

- Case:TO-220, TO-263, TO-263-7L, TO-247, TO-252 Package

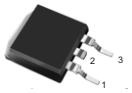
Application

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

TO-220 D180N04



TO-263 D180N04D



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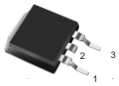
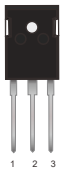
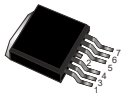


TO-247 D180N04P



TO-263-7L D180N04D7



Ordering Information

Part No.	Package Type	Package	Quality(box)
D180N04	TO-220	Tube	1000
D180N04M	TO-252	Tape & Reel	3000
D180N04D	TO-263	Tape & Reel	800
D180N04D7	TO-263-7L	Tape & Reel	800
D180N04P	TO-247	Tube	600

Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram

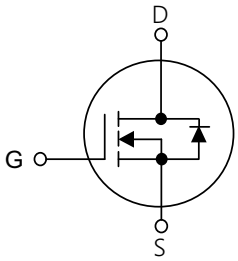


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	D180N04/D180N04D/D180N04D7 D180N04M/D180N04P	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C=25°C	I_D	180	A
	T_C=100°C		126	
Pulsed Drain Current (Note 1)		I_{DM}	720	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	576	mJ
Power Dissipation T_C=25°C		P_D	156	W
Operating Junction and Storage Temperature		T_J/T_{STG}	-55~+175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	D180N04/D180N04D/ D180N04M/D180N04D7 D180N04P	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	75	°C/W
Thermal resistance Junction to Case	$R_{\theta JC}$	0.964	°C/W

Table 3. Electrical Characteristics (T_J=25°C, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V,I_D=250μA	40	-	-	V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=40V,V_{GS}=0V	-	-	1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=20V,V_{DS}=0V	-	-	100	nA
	Reverse		V_{GS}=-20V,V_{DS}=0V	-	-	-100	nA
On Characteristics(Note 4)							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS},I_D=250μA	1.0	1.9	3.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V,I_D=90A	-	2.0	2.5	mΩ
Dynamic Characteristics(Note 5)							
Input Capacitance		C_{ISS}	V_{DS}=20V,V_{GS}=0V,f=1MHz	-	3565	-	pF
Output Capacitance		C_{OSS}		-	1646	-	pF
Reverse Transfer Capacitance		C_{RSS}		-	73	-	pF
Gate Resisitance		R_G	V_{DD}=0V,V_{GS}=0V,f=1MHz	-	2.3	-	Ω
Switching Characteristics (Note 5)							
Turn-On Delay Time		$t_{d(on)}$	V_{DD}=20V,I_D=90A V_{GS}=10V,R_{GEN}=1.6Ω,	-	11	-	ns
Turn-On Rise Time		t_R		-	90	-	ns
Turn-Off Delay Time		$t_{d(off)}$		-	39	-	ns
Turn-Off Fall Time		t_f		-	101	-	ns
Total Gate Charge		Q_G	V_{DD}=20V,I_D=90A, V_{GS}=10V	-	39.4	-	nC
Gate-Source Charge		Q_{GS}		-	17.7	-	nC
Gate-Drain Charge		Q_{GD}		-	10.3	-	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=30A	-	-	1.2	V
Maximum Continuous Drain-Source Diode Forward Current		I_S		-	-	180	A
Reverse Recovery Time		t_{rr}	V_{GS}=0V, I_F=50A dI_F/dt=100A/μs (Note 1)	-	33	-	ns
Reverse Recovery Charge		Q_{RR}		-	16.4	-	nC

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature
2 L=0.5mH, I_D=48A,V_{DD}=32V,V_G=10V ,Starting T_J=25°C
4 Pulse Test: Pulse width ≤300μS, Duty cycle≤2%
5 Guaranteed by design,not subject to production

Typical Characteristics Diagrams

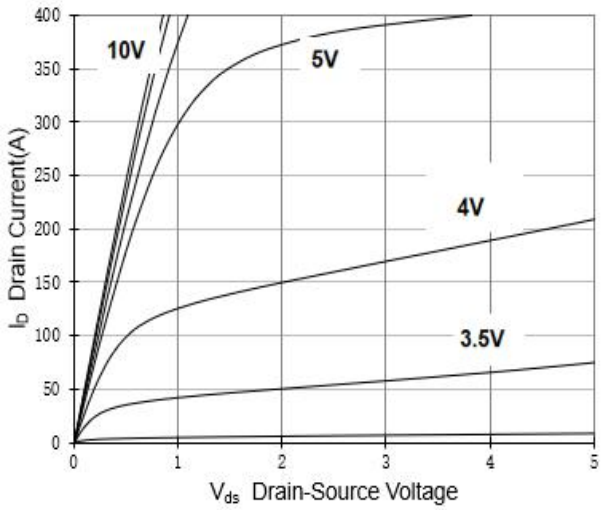


Fig 1. Output Characteristics

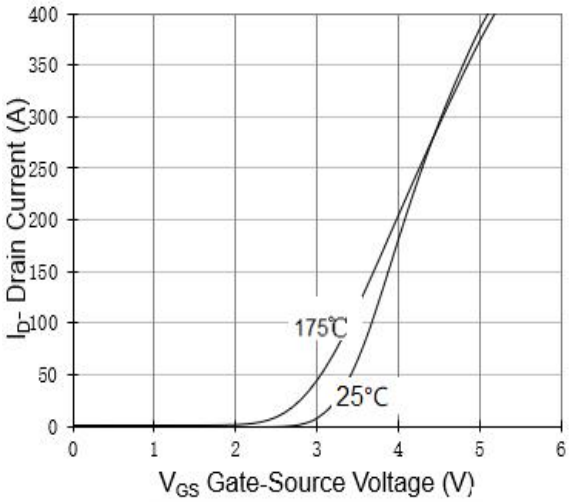


Fig 2. Transfer Characteristics

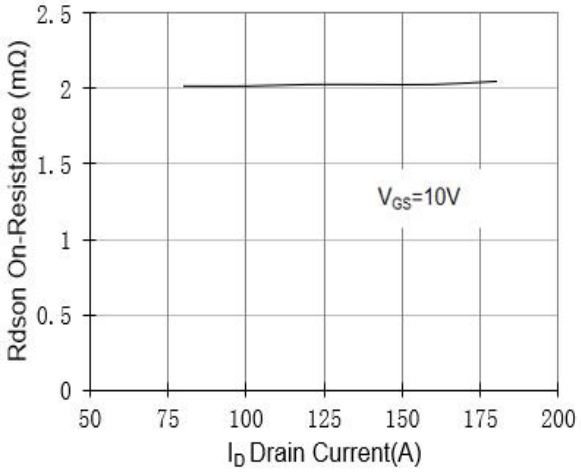


Fig 3. Rdson-Drain Current

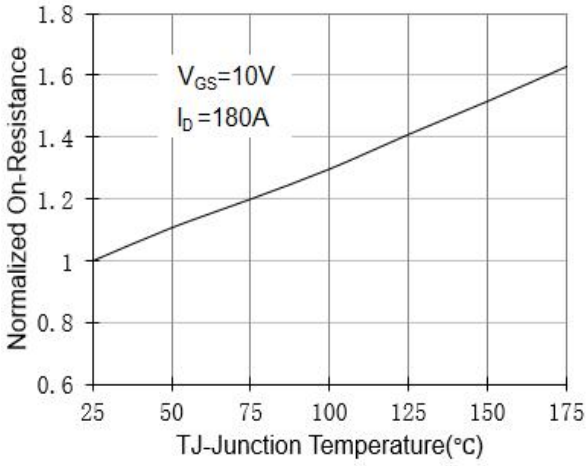


Fig 4. Rdson-Junction Temperature

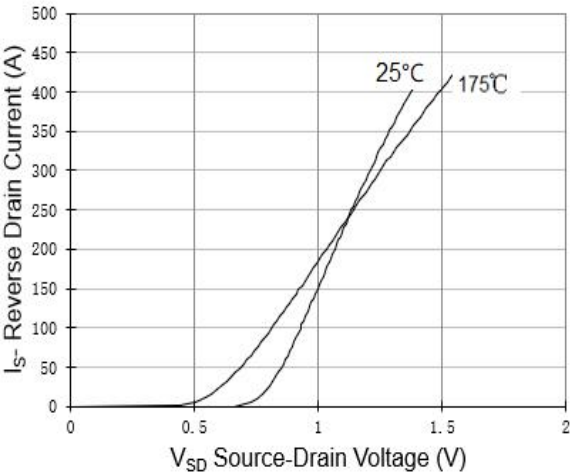


Fig 5. Source-Drain Diode Forward

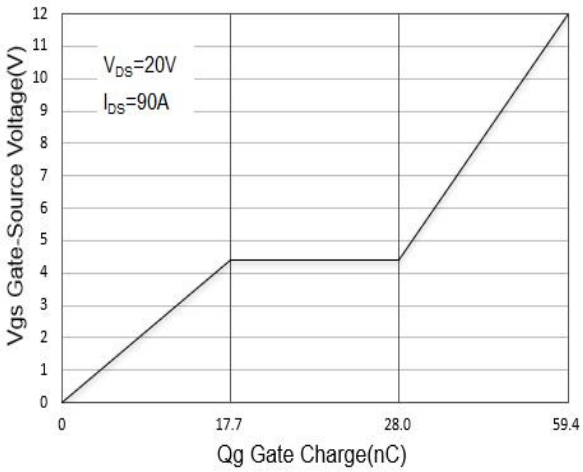


Figure 6 Gate Charge

Typical Characteristics Diagrams

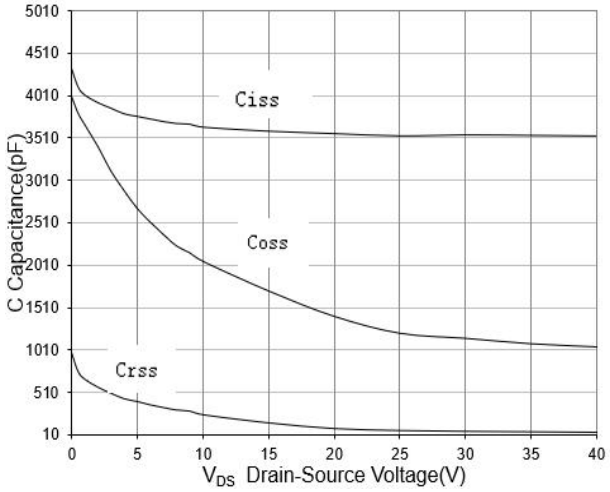


Fig 7. Capacitance vs Vds

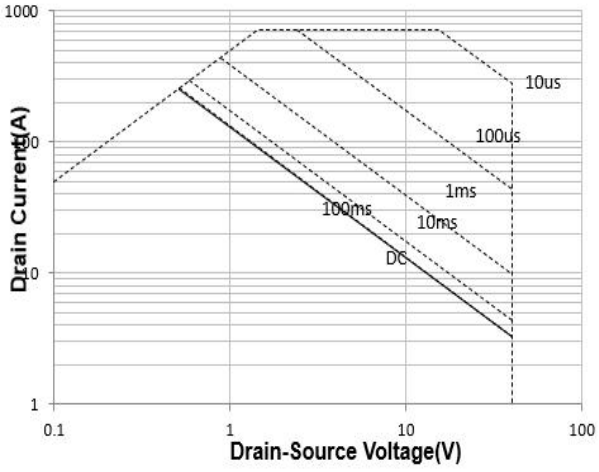


Fig 8. Safe Operation Area

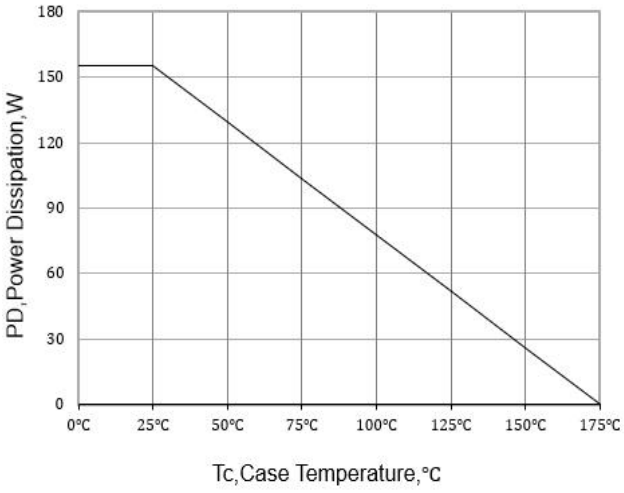


Fig 9. Power De-rating

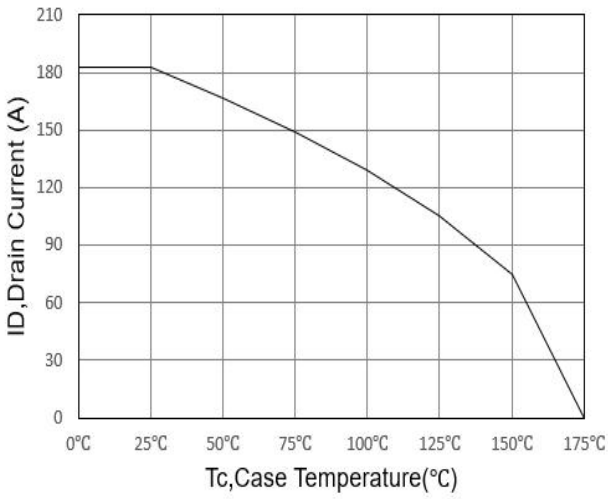


Fig 10. Current De-rating

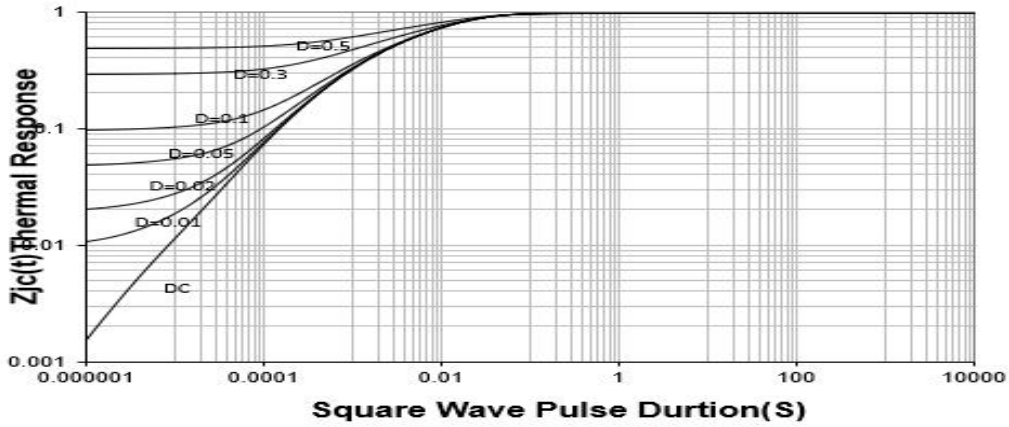
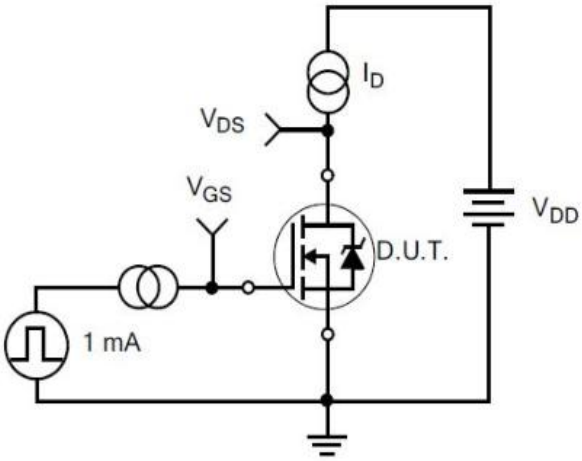
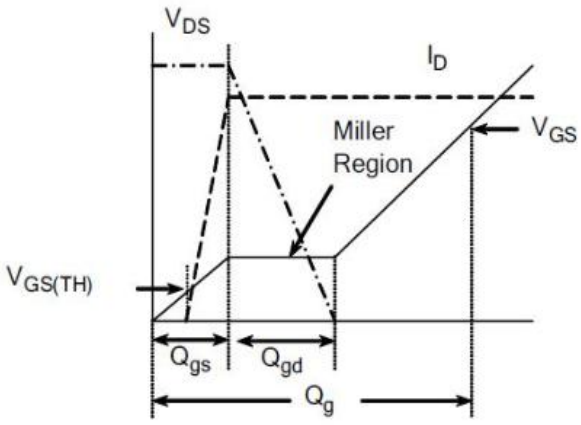


Fig 11. Normalized Maximum Transient Thermal Impedance

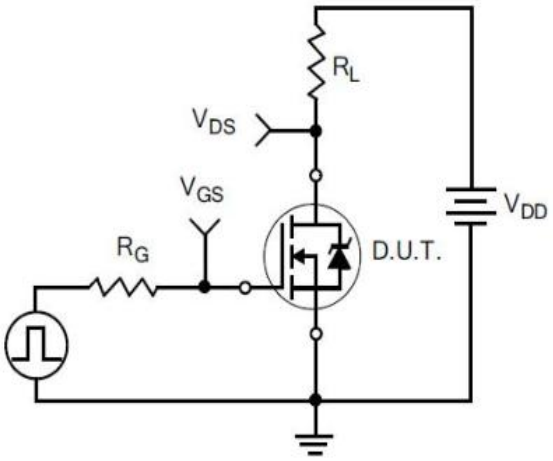
Typical Test Circuit



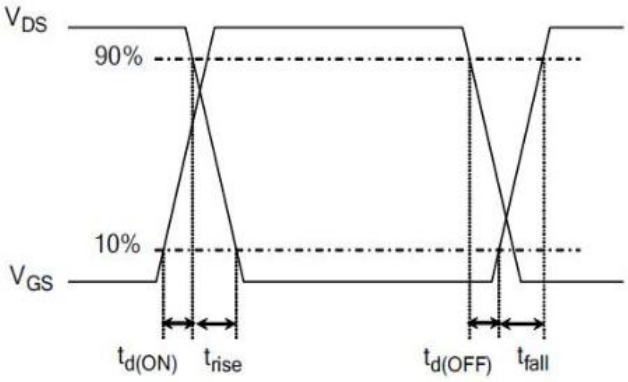
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

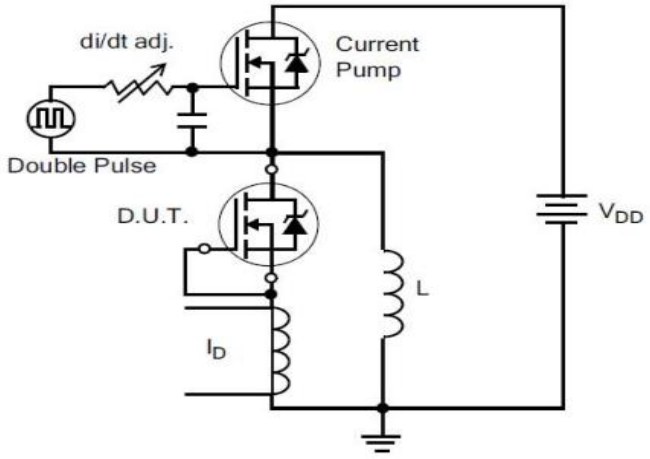


3) Resistive Switching Test Circuit

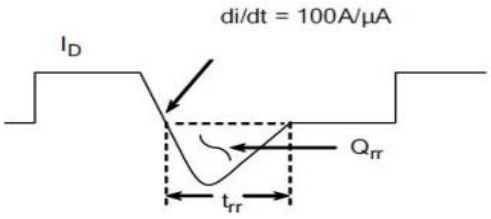


4) Resistive Switching Waveforms

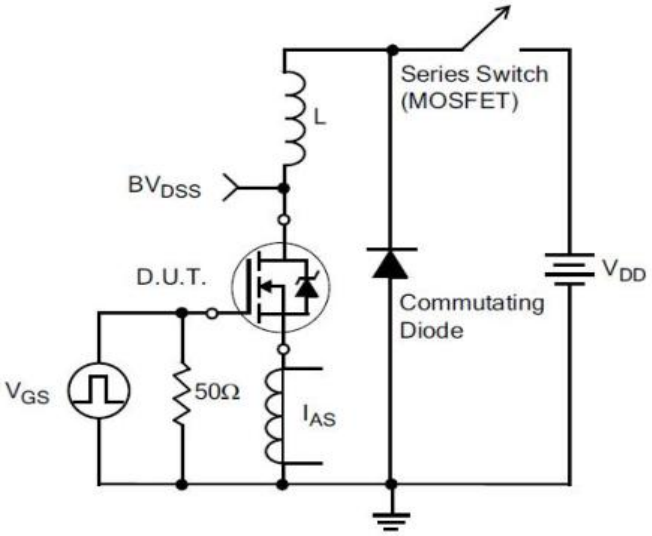
Typical Test Circuit



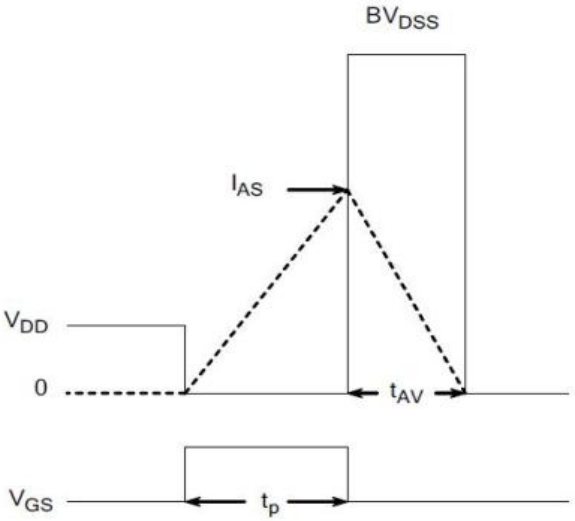
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



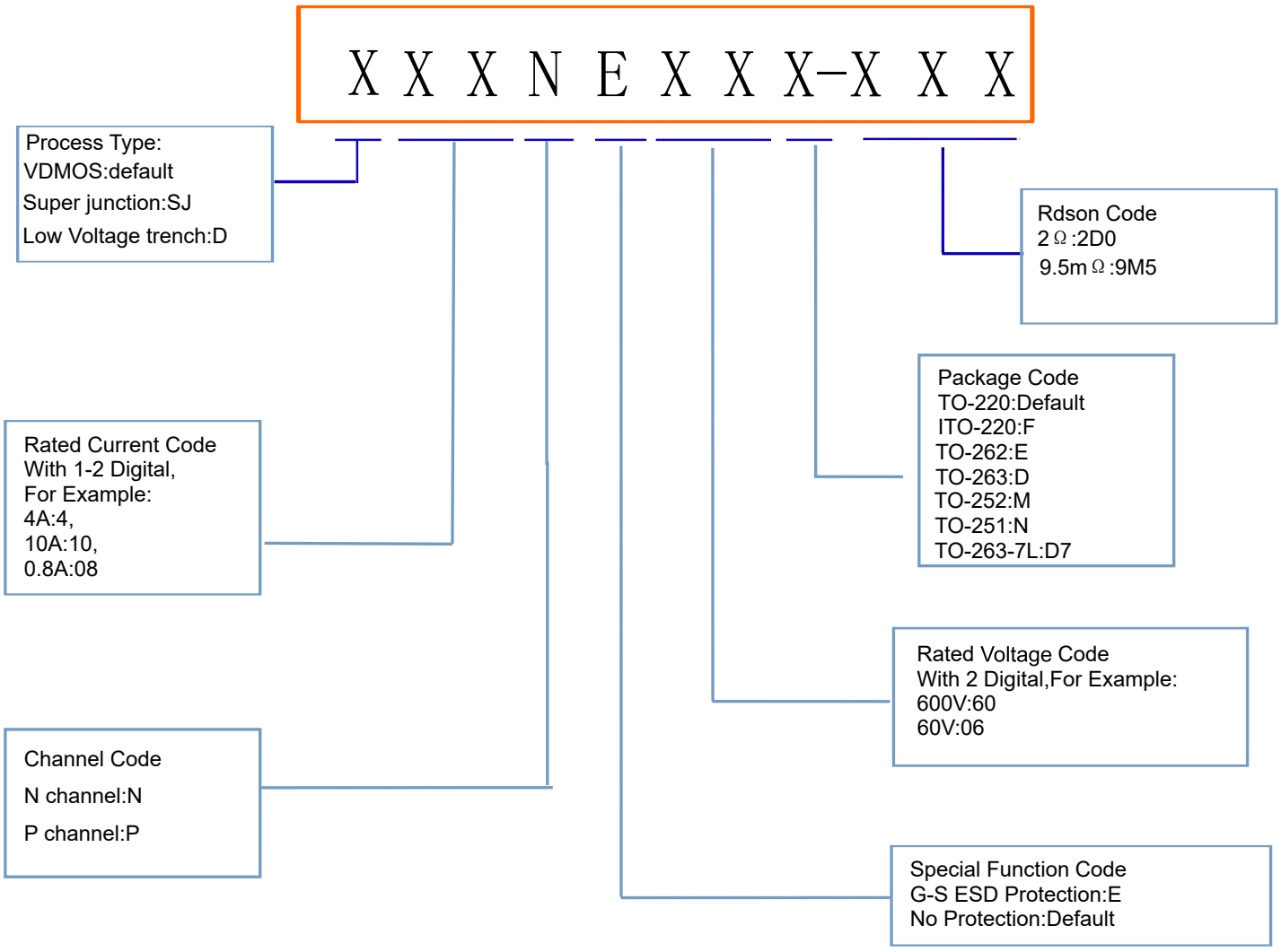
7) . Unclamped Inductive Switching Test Circuit



$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

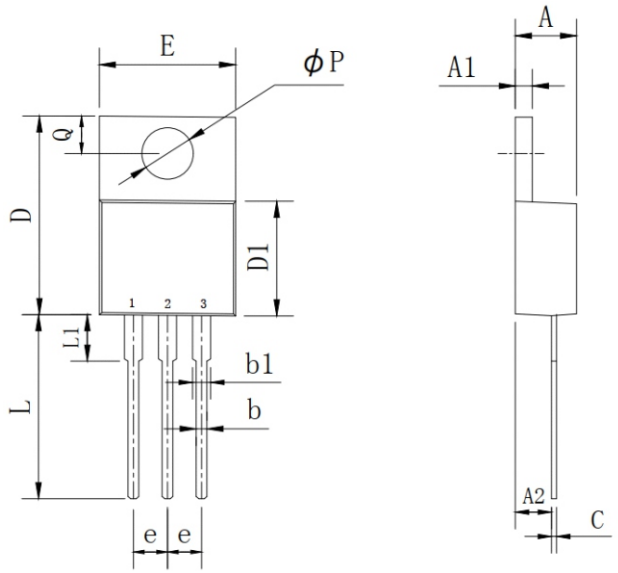
8) Unclamped Inductive Switching Waveforms

Product Names Rules



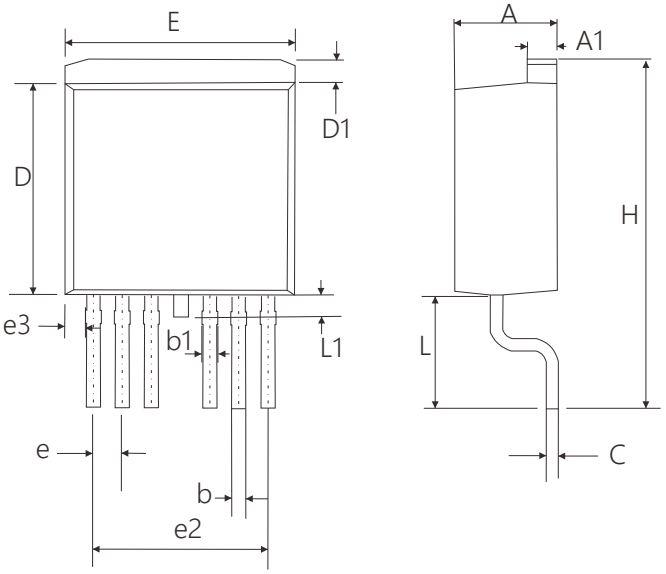
Dimensions

TO-220 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.87	0.167	0.192
A1	1.07	1.47	0.042	0.058
A2	2.03	2.92	0.080	0.115
b	0.51	1.11	0.020	0.044
b1	0.97	1.6	0.038	0.063
C	0.3	0.7	0.012	0.028
D	14.6	15.9	0.575	0.626
D1	8.04	9.3	0.317	0.366
E	9.57	10.57	0.377	0.416
e	2.34	2.74	0.092	0.108
L	12.58	14.3	0.495	0.563
L1	2.8	4.2	0.110	0.165
P	3.4	4.14	0.134	0.163
Q	2.45	3	0.096	0.118

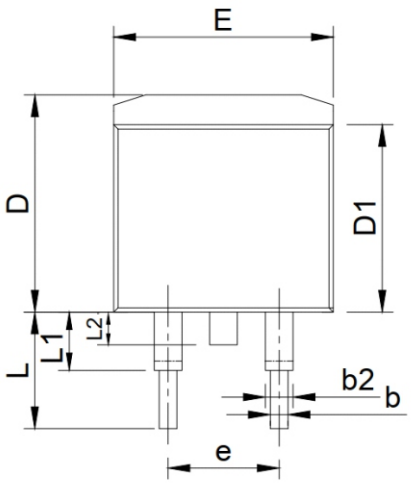
TO-263-7L PACKAGE OUTLINE DIMENSIONS

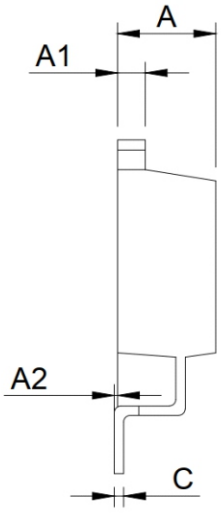


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.75	0.167	0.187
A1	1.2	1.4	0.047	0.055
b	0.5	0.7	0.020	0.028
b1	0.5	0.9	0.020	0.035
C	0.4	0.6	0.016	0.024
D	9.05	9.45	0.356	0.372
D1	0.7	1.3	0.028	0.051
E	9.8	10.2	0.386	0.402
e	1.07	1.47	0.042	0.058
e2	7.32	7.92	0.288	0.312
e3	0.64	1.04	0.025	0.041
H	14.65	15.65	0.577	0.616
L	4.47	5.47	0.176	0.215
L1	0.90	1.50	0.035	0.059

Dimensions

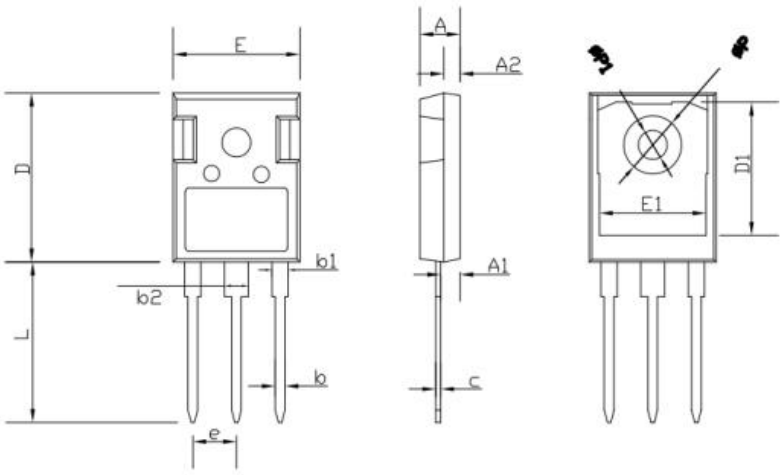
TO-263 PACKAGE OUTLINE DIMENSIONS





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.87	0.167	0.192
A1	1.07	1.47	0.042	0.058
A2	0	0.25	0.000	0.010
b	0.61	1.01	0.024	0.040
b1	1.2	1.34	0.047	0.053
C	0.3	0.6	0.012	0.024
D	9.48	10.84	0.373	0.427
D1	8.49	9.3	0.334	0.366
E	9.7	10.31	0.382	0.406
e	4.88	5.28	0.192	0.208
L	4.46	5.85	0.176	0.230
L1	1.33	2.33	0.052	0.092
L2	0	2.2	0.000	0.087

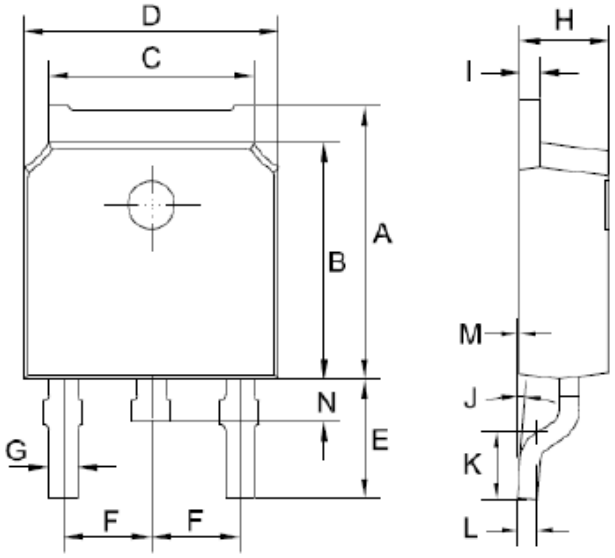
TO-247 PACKAGE OUTLINE DIMENSIONS



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

Dimensions

TO-252 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	6.85	7.25	0.270	0.285
B	5.8	6.3	0.228	0.248
C	5	5.53	0.197	0.218
D	6.3	6.8	0.248	0.268
E	2.6	3.3	0.102	0.130
F	2.19	2.39	0.086	0.094
G	0.45	0.85	0.018	0.033
H	2.2	2.4	0.087	0.094
I	0.41	0.61	0.016	0.024
J	0ú	8ú	0ú	8ú
K	1.45	1.85	0.057	0.073
L	0.41	0.61	0.016	0.024
M	0	0.12	0.000	0.005
P	0.6	1	0.024	0.039

Friendship Reminder

■ JiNan JingHeng（hereinafter referred to as JH） reserves the right to make changes to this document and its products and specifications at anytime without notice.

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