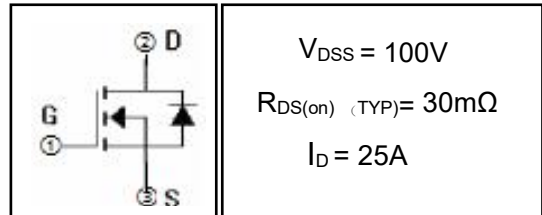


## 25A 100V N-channel Enhancement Mode Power MOSFET

### 1 Description

These N-channel Enhanced VDMOSFETs Used advanced trench technology design, provided excellent R<sub>DS(on)</sub> and low gate charge. Which accords with the RoHS standard.

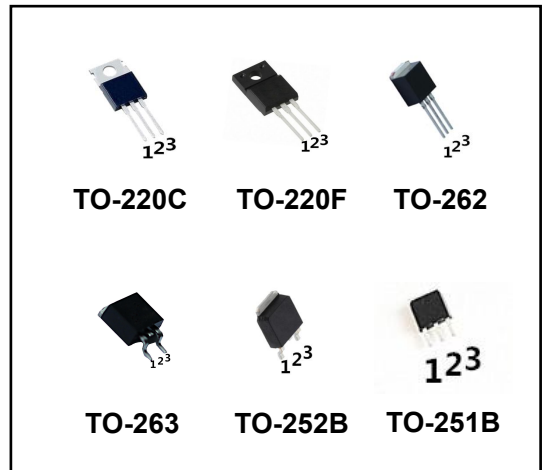


### 2 Features

- Fast Switching
- Low ON Resistance( $R_{DS(on)} \leq 36m\Omega$ )
- Low Gate Charge(Typical:61nC)
- Low Reverse Transfer Capacitances(Typical:84pF)
- 100% Single Pulse Avalanche Energy Test
- 100%  $\Delta V_{DS}$  Test

### 3 Applications

- Power switching applications
- LED Boost
- UPS power supply
- Load switch



### 4 Electrical Characteristics

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

Parameter	Symbol	Value		Units	
		25N10/I25N10/E25N10 /B25N10/D25N10	F25N10		
Maximum Drain-Source DC Voltage	$V_{DS}$	100		V	
Maximum Gate-Drain Voltage	$V_{GS}$	$\pm 20$		V	
Drain Current(continuous)	$I_D (T=25^\circ C)$ $(T=100^\circ C)$	30		A	
		21		A	
Drain Current(Pulsed) <sup>(Note 1)</sup>	$I_{DM}$	90		A	
Single Pulse Avalanche Energy <sup>(Note 5)</sup>	$E_{AS}$	36		mJ	
Avalanche Current <sup>(Note 1)</sup>	$I_{AS}$	12		A	
Total Dissipation	$T_a=25^\circ C$	$P_{tot}$	2	2	W
	$T_c=25^\circ C$	$P_{tot}$	88	35	W
Junction Temperature	$T_j$	175		$^\circ C$	
storage Temperature	$T_{stg}$	-55~175		$^\circ C$	
Maximum Temperature for soldering	$T_L$	300		$^\circ C$	

#### 4.2 Thermal Characteristics

Parameter	Symbol	Value		Unit
		25N10/I25N10/E25N10 /B25N10/D25N10	F25N10	
Thermal Resistance Junction to Case-sink	$R_{thJC}$	1.7	4.29	$^\circ C/W$
Thermal Resistance Junction to Ambient	$R_{thJA}$	75	75	$^\circ C/W$

**4.3 Electrical Characteristics** (T<sub>c</sub>=25°C, unless otherwise noted)

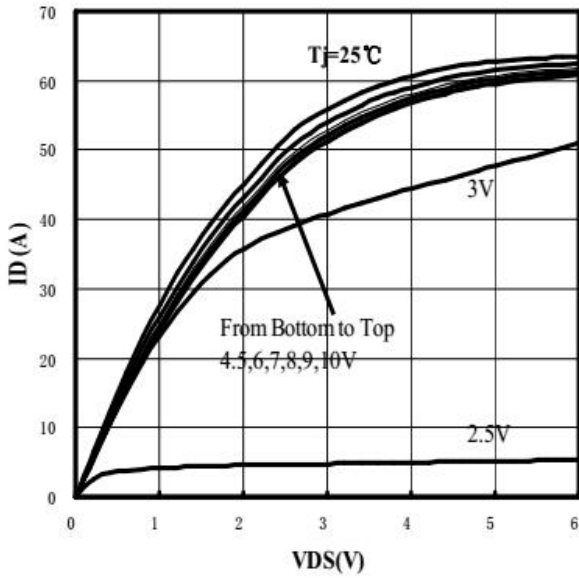
Parameter	Symbol	Test Condition	Value			Units
			Min	Typ	Max	
<b>Off Characteristics</b>						
Drain-source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	100	--	--	V
Drain-to-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, T <sub>C</sub> =25°C	--	--	1	μA
		V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>C</sub> =125°C	--	--	100	μA
Gate-to-Source Forward Leakage	I <sub>GSSF</sub>	V <sub>GS</sub> =+20V	--	--	100	nA
Gate-to-Source Reverse Leakage	I <sub>GSSR</sub>	V <sub>GS</sub> =-20V	--	--	-100	nA
<b>On Characteristics</b> (Note 3)						
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.2	--	2.5	V
Drain-source on Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =12A	--	30	36	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	--	32	40	
<b>Dynamic Characteristics</b> (Note 4)						
Forward Transfer conductance	g <sub>fs</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =12A	--	59	--	S
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =50V, f=1.0MHz	--	3540	--	pF
Output Capacitance	C <sub>oss</sub>		--	107	--	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	84	--	
Gate Resisitance	R <sub>G</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, F=1MHz	--	1.3	--	Ω
<b>Switching Characteristics</b> (note4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DS</sub> =50V, I <sub>D</sub> =12A, V <sub>GS</sub> =10V, R <sub>GEN</sub> =3Ω	--	13	--	nS
Turn-on Rise Time	t <sub>r</sub>		--	26	--	nS
Turn-off Delay Time	t <sub>d(off)</sub>		--	77	--	nS
Turn-off Fall Time	t <sub>f</sub>		--	17	--	nS
Total Gate Charge	Q <sub>g</sub>	I <sub>D</sub> =12A, V <sub>DS</sub> =80V, V <sub>GS</sub> =10V	--	61	--	nC
Gate-to-Source Charge	Q <sub>gs</sub>		--	7.1	--	
Gate-to-Drain("Miller") Charge	Q <sub>gd</sub>		--	14	--	
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	V <sub>FSD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =12A	--	0.8	1.2	V
Diode Forward Current (Note 2)	I <sub>S</sub>		--	--	30	A
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> =25°C, I <sub>F</sub> =12A, dI <sub>F</sub> /dt=100A/μS, V <sub>GS</sub> =0V	--	50	--	nS
Reverse Recovery Charge	Q <sub>rr</sub>		--	75	--	nC

Notes:

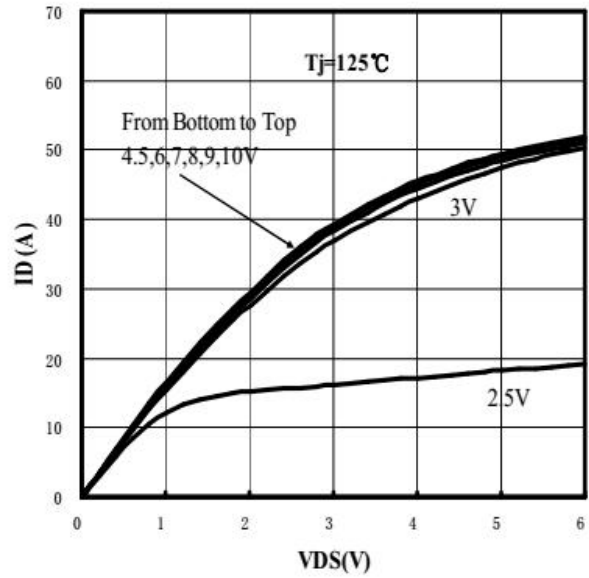
- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board, t<sub>s</sub>≤10sec.
- 3: Pulse width ≤ 300μs, duty cycle ≤ 2%.
- 4: Guaranteed by design, not subject to production.
- 5: L=0.5mH, I<sub>D</sub>=12A, V<sub>DD</sub>=50V, V<sub>GATE</sub>=100V, Start T<sub>J</sub>=25°C.

**5 Typical characteristics diagrams**

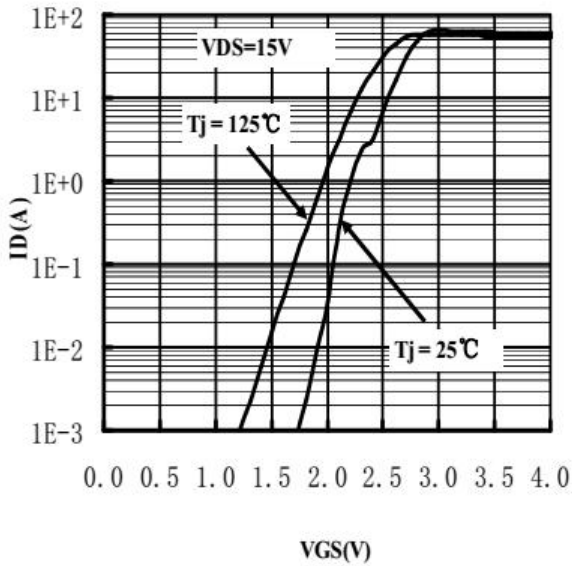
**Figure 1. Typ. Output Characteristics**



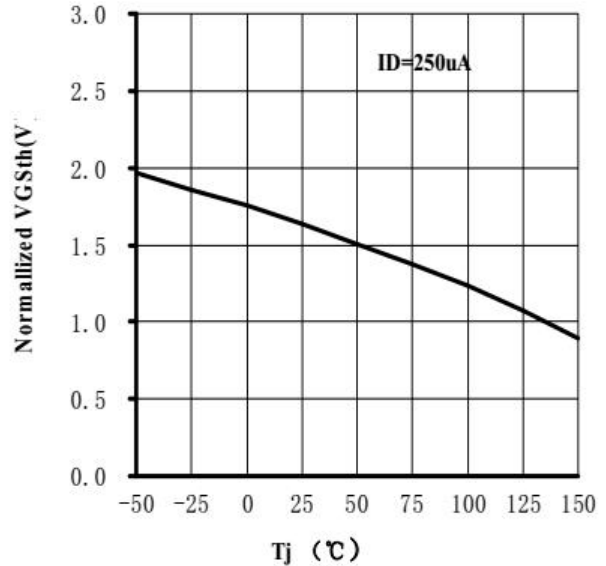
**Figure 2. Typ. Output Characteristics**



**Figure 3. Transfer Characteristics**

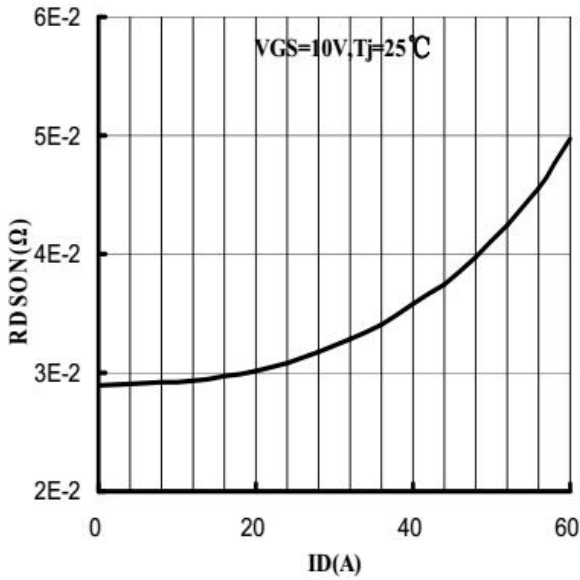


**Figure 4. Gate Threshold Voltage Characteristics**

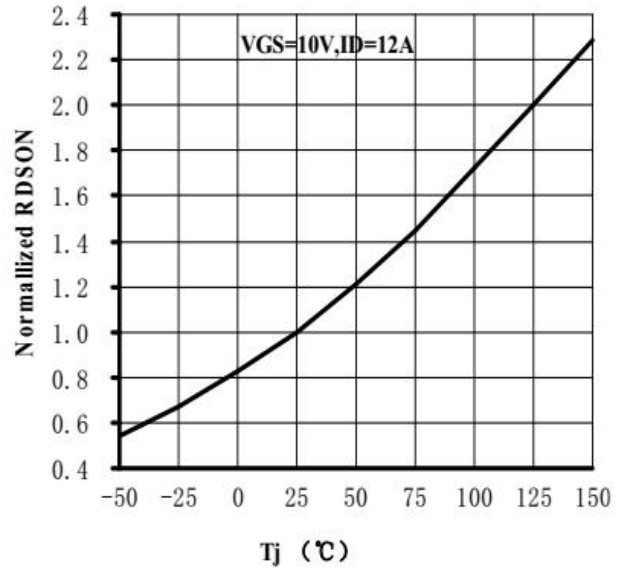


**5 Typical characteristics diagrams(continues)**

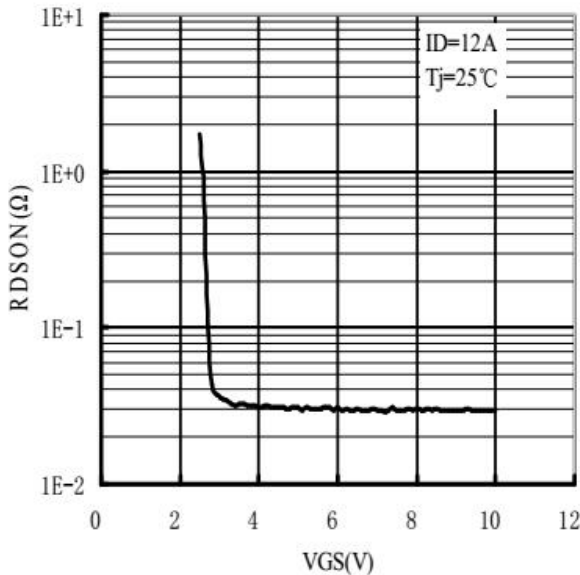
**Figure 5. Rdson vs. Drain Current Characteristics**



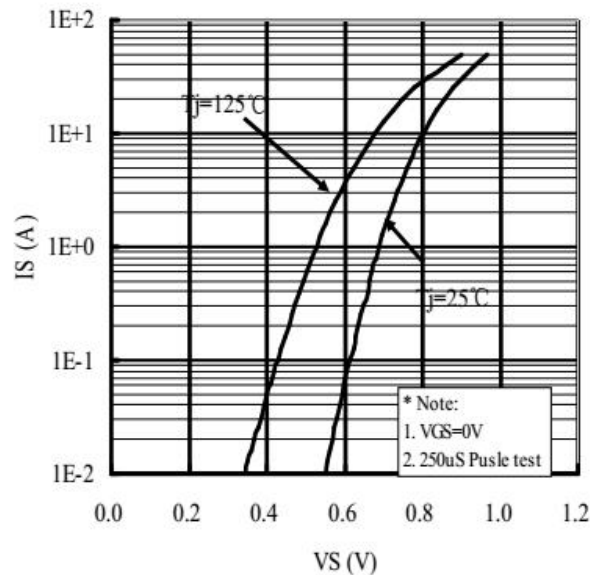
**Figure 6. Rdson vs. Junction Tem Characteristics**



**Figure 7. Rdson vs. VGS Characteristics**



**Figure 8. IS vs. VSD Characteristics**



5 Typical characteristics diagrams(continues)

Figure 9. Gate Charge Characteristics

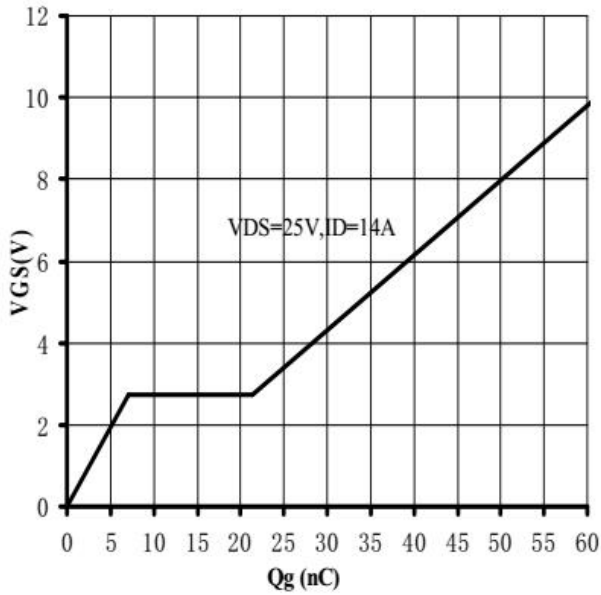


Figure 10. Capacitance Characteristics

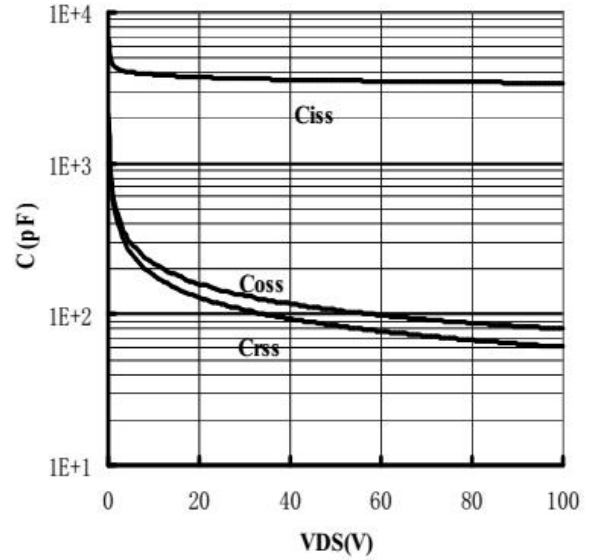
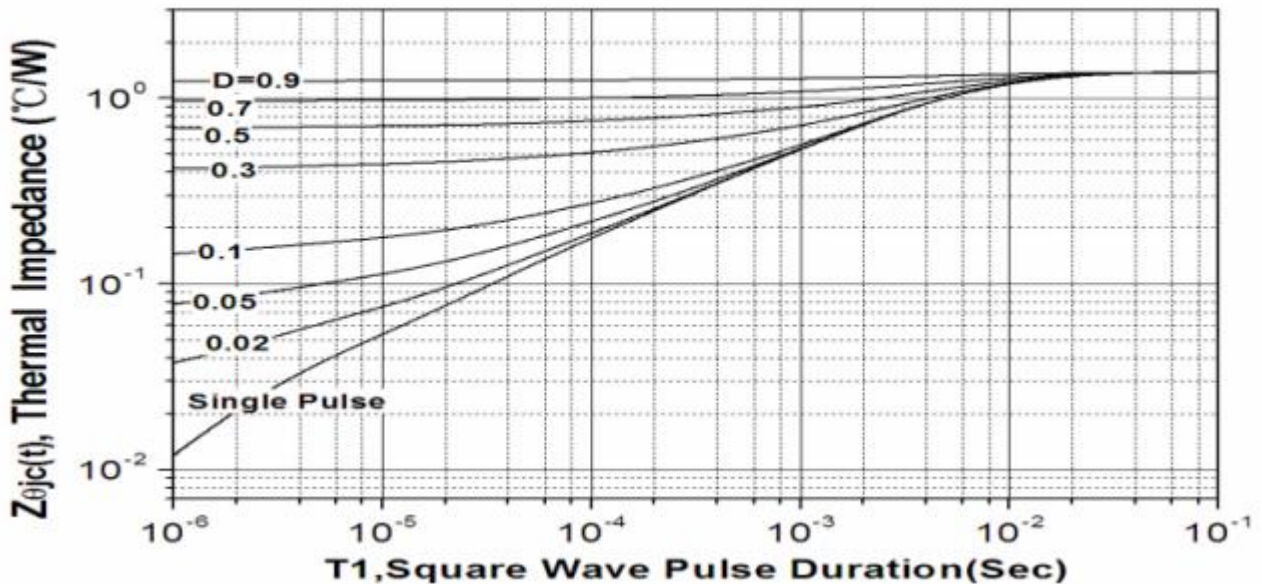


Figure 11. Thermal Resistance Characteristics



**6 Typical Test Circuit and Waveform**

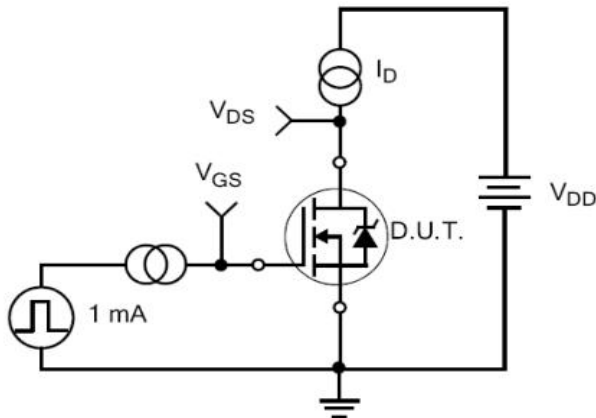


Figure 17. Gate Charge Test Circuit

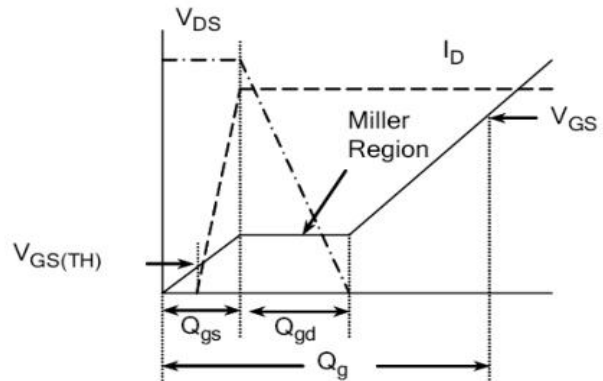


Figure 18. Gate Charge Waveform

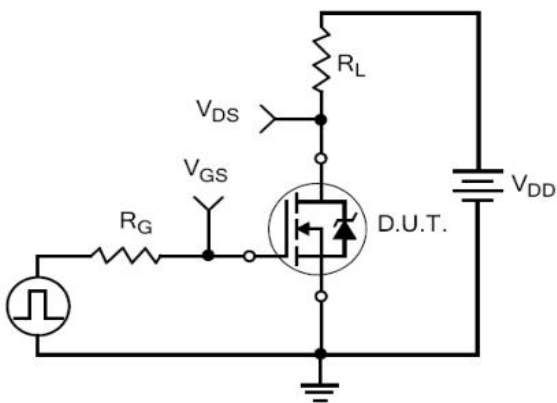


Figure 19. Resistive Switching Test Circuit

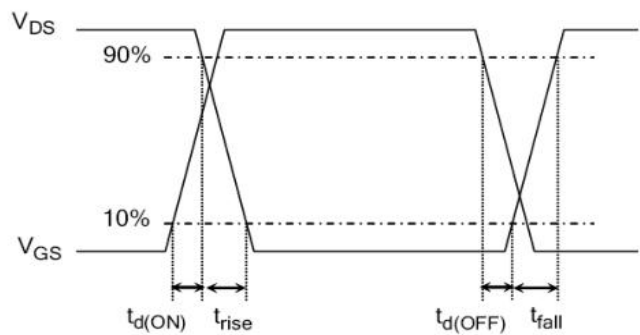


Figure 20. Resistive Switching Waveforms

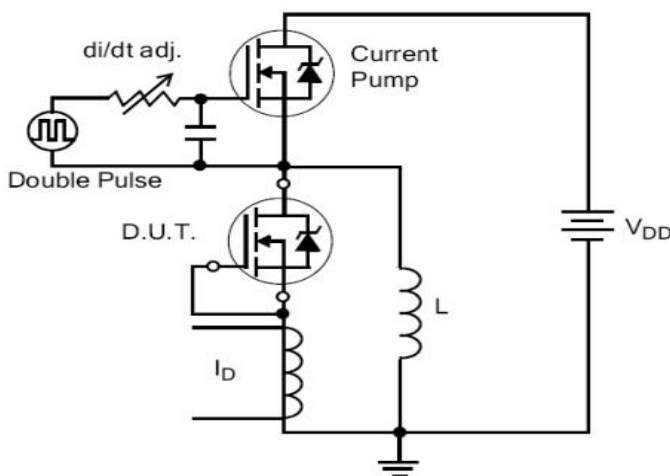


Figure 21. Diode Reverse Recovery Test Circuit

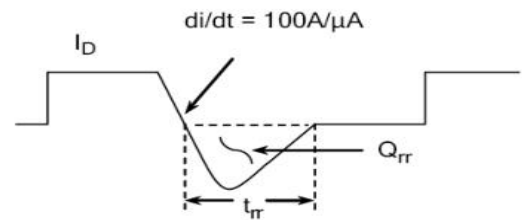


Figure 22. Diode Reverse Recovery Waveform

## 6 Typical Test Circuit and Waveform(continues)

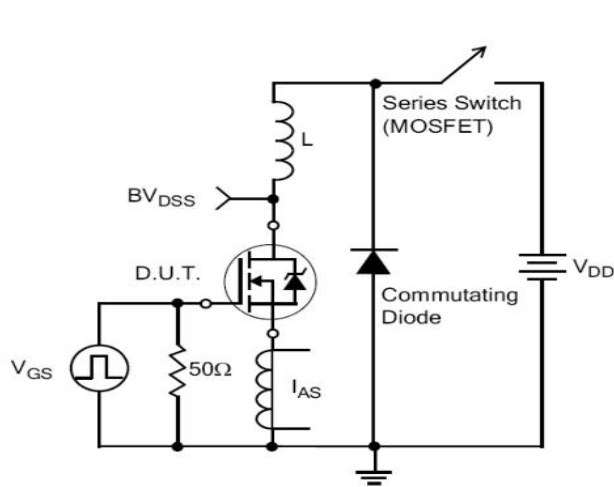


Figure 23. Unclamped Inductive Switching Test Circuit

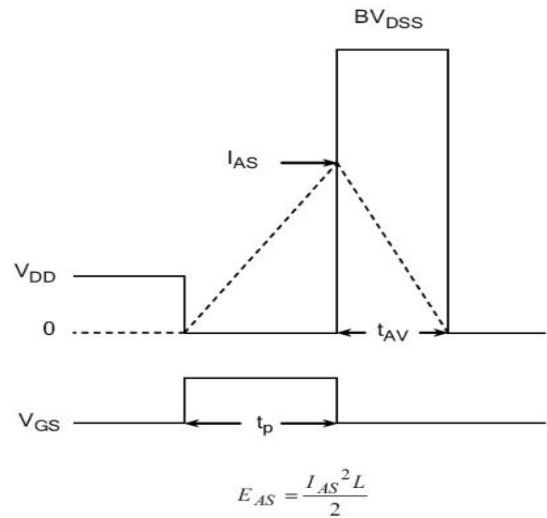


Figure 24. Unclamped Inductive Switching Waveforms

## 7 Product Names Rules

**F X X N E X X**

**Packaging Code**  
 220F: F    220: Nothing  
 251: B    252: D  
 262: I    263: E

**Rated Voltage Code**  
 With 2 Digital, For Example:  
 60 on behalf of 600V,  
 06 on behalf of 60v

**Rated Current Code**  
 With 1-2 Digital,  
 For Example:  
 4 on behalf of 4A,  
 10 on behalf of 10A,  
 08 on behalf of 0.8A

**Special Function Code**  
 E on behalf of build-in ESD  
 Nothing on behalf of not ESD

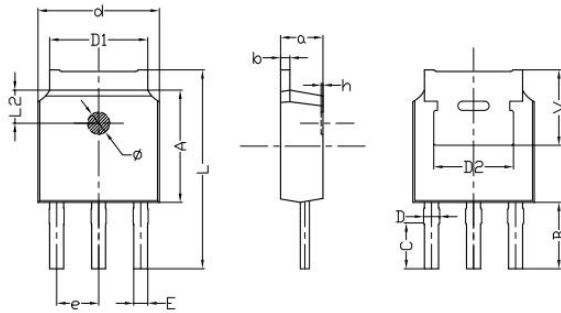
**Channel Polarity Code**  
 N on behalf of N channel  
 P on behalf of P channel

## 8 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	RoHS	Package	Quantity
25N10	TO-220C	25N10	Pb-free	Tube	1000/box
F25N10	TO-220F	F25N10	Pb-free	Tube	1000/box
B25N10	TO-251	B25N10	Pb-free	Tube	1000/box
D25N10	TO-252	D25N10	Pb-free	Tape & Reel	3000/box
I25N10	TO-262	I25N10	Pb-free	Tube	1000/box
E25N10	TO-263	E25N10	Pb-free	Tape & Reel	800/box

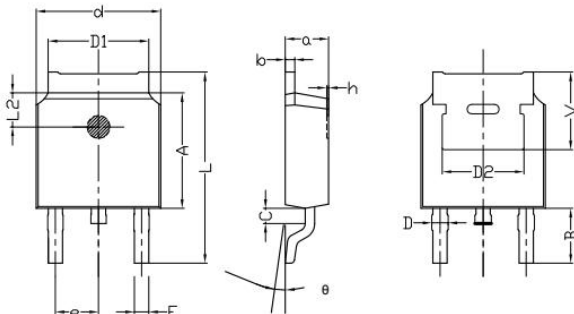
## 9 Dimensions

TO-251B PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
a	2.20	2.40	0.087	0.0946
b	0.46	0.58	0.018	0.023
c	2.45	2.65	0.097	0.104
D	0.80	0.90	0.032	0.035
d	6.30	6.70	0.248	0.264
D1	5.00	5.50	0.197	0.217
D2	TYP 4.83		TYP 0.190	
A	5.80	6.20	0.228	0.244
e	2.19	2.39	0.086	0.094
L	10.40	11.00	0.4098	0.4334
B	3.50	3.70	0.1379	0.1458
L2	1.5	1.8	0.059	0.071
phi	1.10	1.30	0.0433	0.0512
h	0.00	0.30	0.000	0.012
V	5.25	5.85	0.207	0.230
E	0.60	0.80	0.0236	0.0315

TO-252B PACKAGE OUTLINE DIMENSIONS

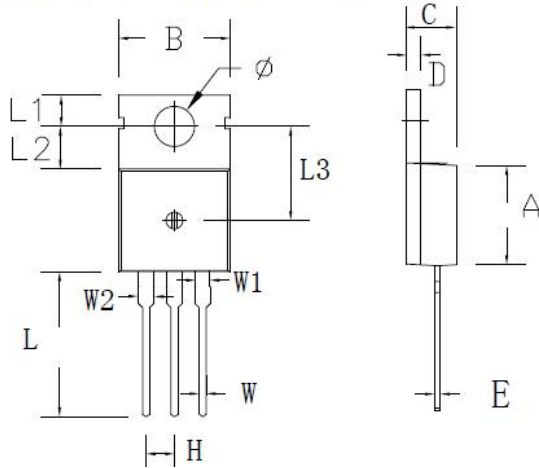


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
a	2.20	2.40	0.087	0.095
b	0.46	0.58	0.018	0.023
c	0.70	0.90	0.028	0.035
D	0.80	1.00	0.032	0.039
d	6.30	6.70	0.248	0.264
D1	5.00	5.50	0.197	0.217
D2	TYP 4.83		TYP 0.190	
A	5.80	6.20	0.228	0.244
e	2.19	2.39	0.086	0.094
L	9.40	10.40	0.370	0.409
B	2.6	3.2	0.102	0.126
L2	1.5	1.8	0.059	0.071
theta	0	8	0	8
h	0	0.3	0	0.012
V	5.25	5.85	0.207	0.230



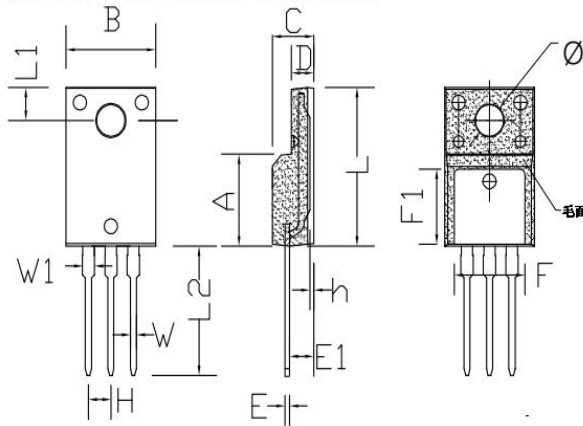
**9 Dimensions(continues)**

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

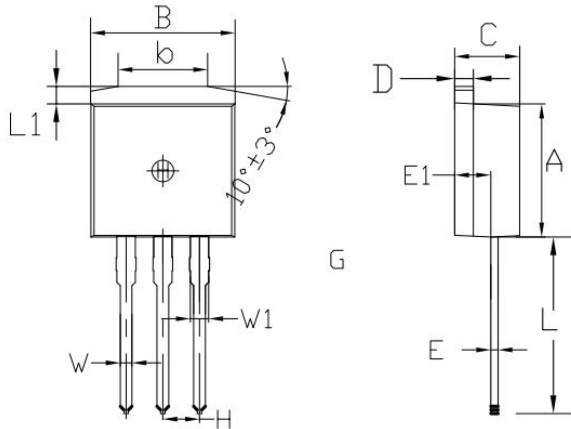
TO-220F PACKAGE OUTLINE DIMENSIONS



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

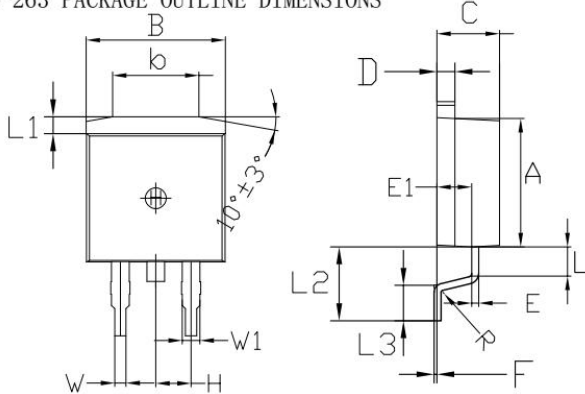
**9 Dimensions(continues)**

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

- ROUM 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 Roma 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
2017.05.15	1.0	Original	