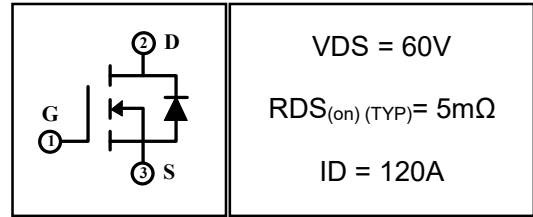


120A 60V N-channel Enhancement Mode Power MOSFET

1 Description

These N-channel enhancement mode power MOSFETS Used advanced trench technology design, provided excellent RDS(on) and low gate charge. Which accords with the RoHS standard.



2 Features

- Low On Resistance
- Low Gate Charge
- Fast Switching
- Low Reverse Transfer Capacitances
- 100% Single Pulse Avalanche Energy Test
- 100% ΔV_{DS} Test

3 Applications

- Switching power supply
- Inverter power management system
- Power tool control
- Automotive electronics applications
- Ups



4 Electrical Characteristics

4.1 Absolute Maximum Ratings (T_c=25°C, unless otherwise noted)

Parameter	Symbol	Value		Units
		D3205Z5/ID3205Z5/ED3205Z5	FD3205Z5	
Drain-Source Voltage	V _{DS}	60		V
Gate-Source Voltage	V _{GS}	±25		V
Drain Current(continuous) ^(Note 3)	I _D	120		A
Drain Current(continuous)(T=100°C) ^(Note 3)	I _D (100°C)	86		A
Drain Current(Pulsed) ^(Note 4)	I _{DM}	360		A
Avalanche Current ^(Note 5)	I _{AS}	25		A
Single Pulse Avalanche Energy ^(Note 5)	E _{AS}	250		mJ
Maximum Power Dissipation	T _a =25°C	2	2	W
	T _C =25°C	204	60	W
Operating Junction Temperature Range	T _j	175		°C
Storage Temperature Range	T _{stg}	-55 ~ 175		°C
High Temperature(tin solder)	T _L	300		°C

4.2 Thermal Characteristics

Parameter	Symbol	Value		Unit
		D3205Z5/ID3205Z5/ED3205Z5	FD3205Z5	
Thermal Resistance, Junction to Case-sink	R _{thJC}	0.735	2.5	°C/W
Thermal Resistance, Junction to Ambient	R _{thJA}	75	75	°C/W

4.3 Electrical Characteristics (Tc=25°C, unless otherwise noted)

Parameter	Symbol	Test Condition	Value			Units
			Min	Typ	Max	
Off Characteristics						
Drain-source Breakdown Voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	60	70	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V, T_C=25^\circ C$	--	--	1	μA
		$V_{DS}=48V, V_{GS}=0V, T_C=125^\circ C$	--	--	100	μA
Gate-to-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 25V, V_{DS}=0V$	--		± 100	nA
On Characteristics (Note 3)						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	--	4	V
Drain-source on Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=40A$	--	5	7	m Ω
Gate Resitance	R_G	$V_{DD}=0V, V_{GS}=0V, F=1MHz$	--	1.2	--	Ω
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=25V, f=1.0MHz$	--	3100	--	pF
Output Capacitance	C_{oss}		--	926	--	
Reverse Transfer Capacitance	C_{rss}		--	451	--	
Switching Characteristics (note4)						
Turn-on Delay Time	$t_{d(on)}$	$I_D=70A, V_{DD}=30V, V_{GS}=10V, R_G=25\Omega$	--	20	--	nS
Turn-on Rise Time	t_r		--	83.7	--	
Turn-off Delay Time	$t_{d(off)}$		--	108	--	
Turn-off Fall Time	t_f		--	92.6	--	
Total Gate Charge	Q_g	$I_D=70A, V_{DD}=50V, V_{GS}=10V$	--	66.34	--	nC
Gate-to-Source Charge	Q_{gs}		--	12.35	--	
Gate-to-Drain("Miller") Charge	Q_{gd}		--	33.52	--	
Drain-Source Diode Characteristics						
Diode Forward Voltage ⁽³⁾	V_{SD}	$V_{GS}=0V, I_S=120A$	--	--	1.3	V
Diode Forward Current ⁽²⁾	I_S		--	--	120	A
Reverse Recovery Time	t_{rr}	$T_J=25^\circ C, I_F=70A, di_F/dt=100A/\mu S, V_{GS}=0V$	--	15.2	--	nS
Reverse Recovery Charge	Q_{rr}		--	6.16	--	nC

Notes:

- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board, $t \leq 10sec$.
- 3: Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 4: Guaranteed by design, not subject to production.
- 5: $L=0.5mH, I_D=31.7A, V_{DD}=50V, V_{GATE}=60V, Start T_J=25^\circ C$.

5 Typical characteristics diagrams

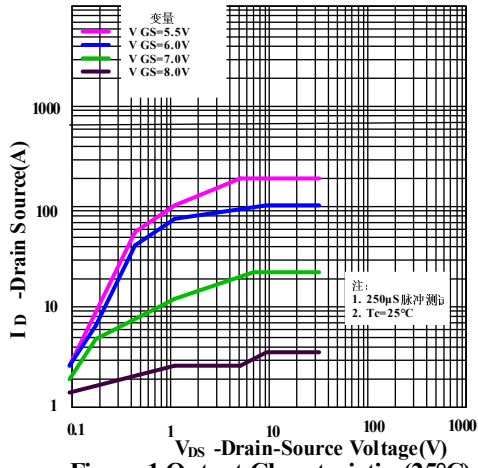


Figure.1 Output Characteristics(25°C)

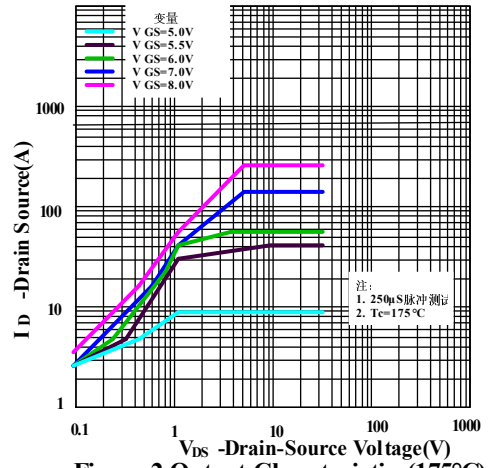


Figure.2 Output Characteristics(175°C)

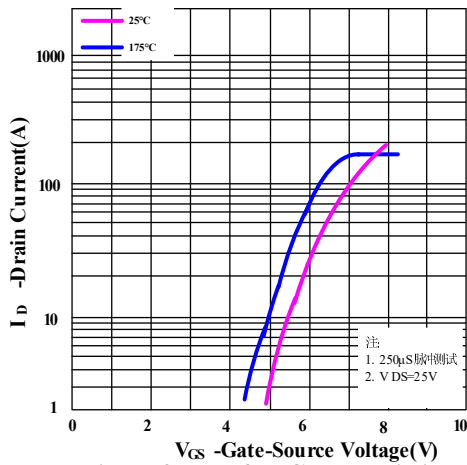


Figure.3 Transfer Characteristics

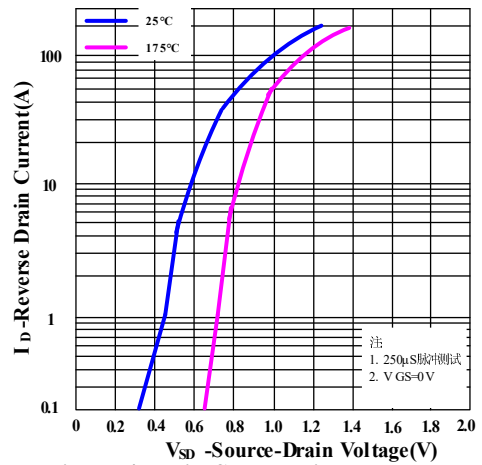


Figure.4 Drain-Source Diode Forward Voltage

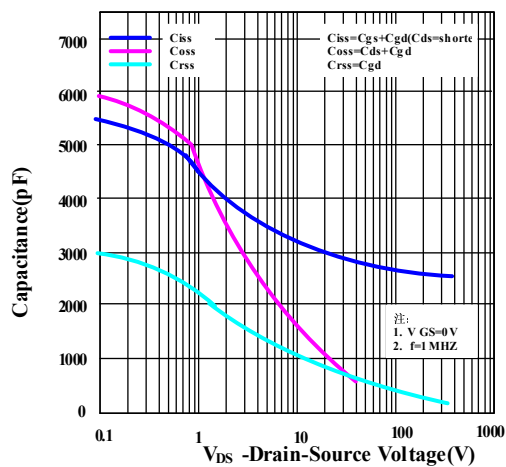


Figure.5 Capacitance

5 Typical characteristics diagrams(continues)

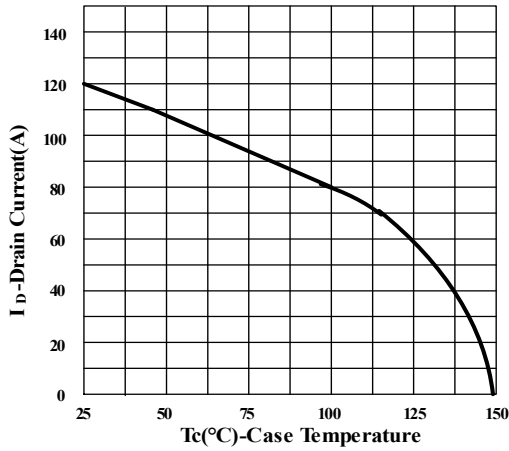


Figure.6 Maximum Drain Source VS Case Temperature

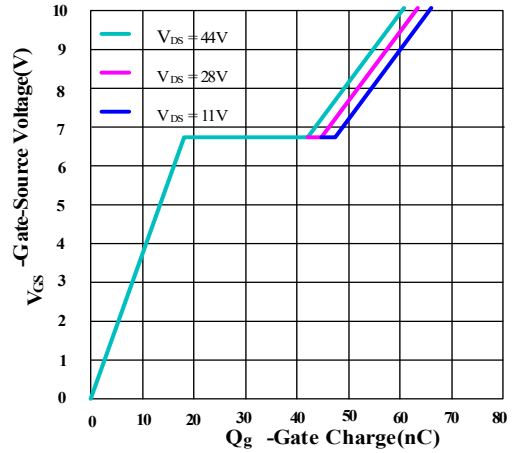


Figure.7 Gate Charge

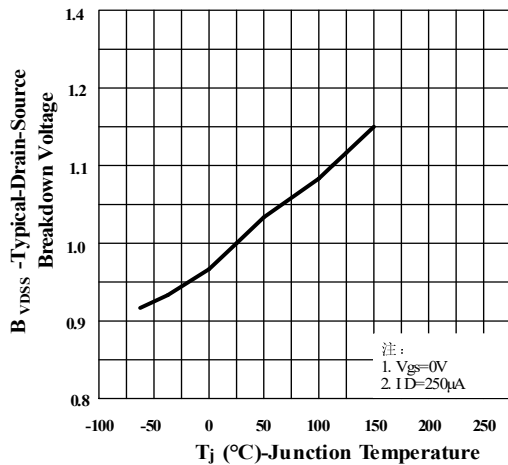


Figure.8 Breakdown Voltage VS Temperature Characteristics

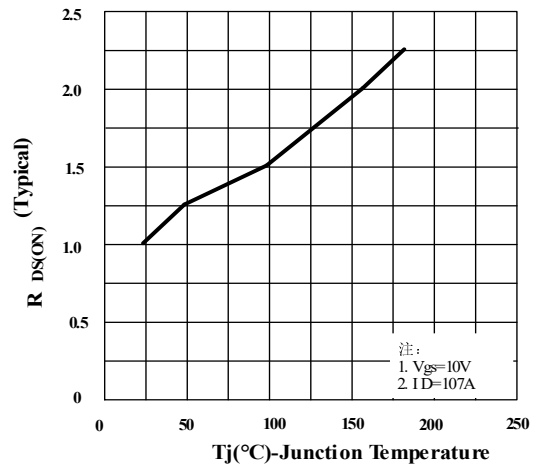


Figure.9 Drain to Source On Resistance VS Temperature Characteristics

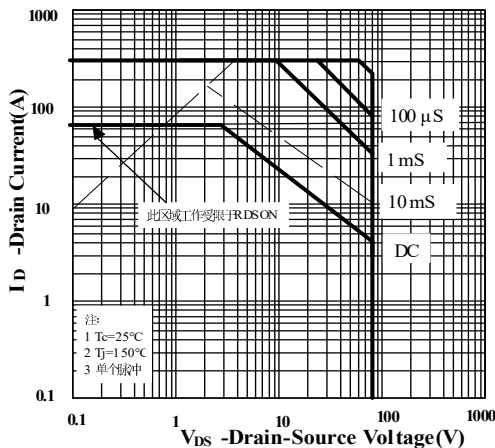
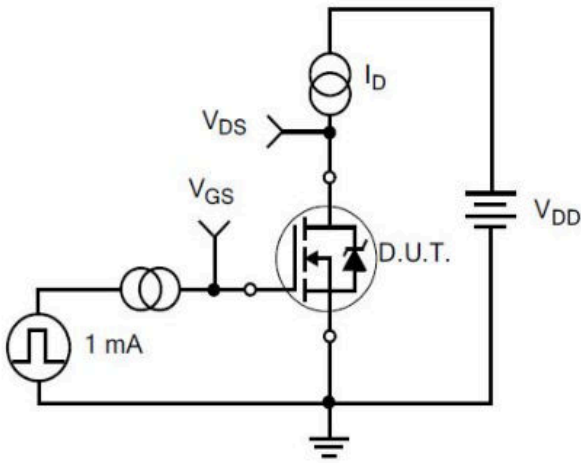
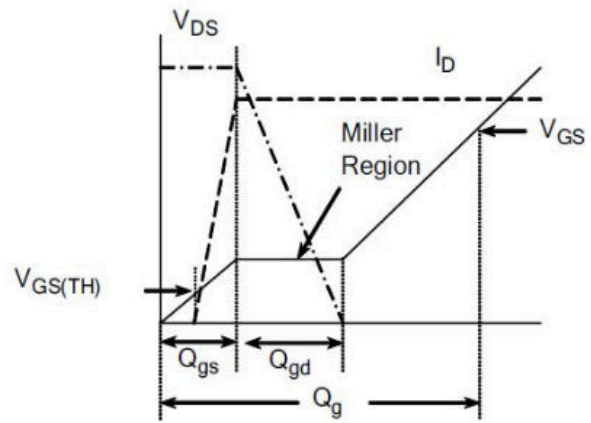


Figure.10 Maximum Safe Operating Area

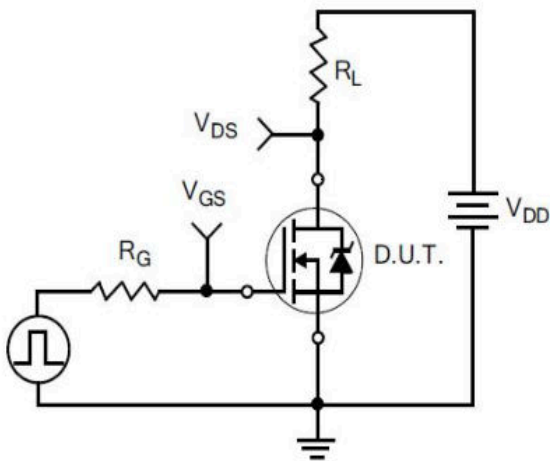
6 Typical Test Circuit and Waveform



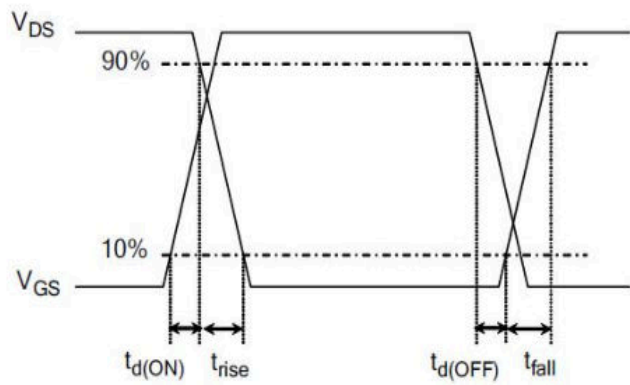
1) Gate Charge Test Circuit



2) Gate Charge Waveform

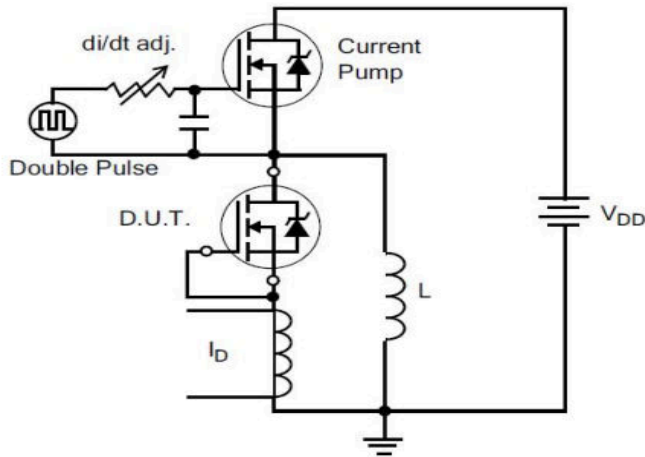


3) Resistive Switching Test Circuit

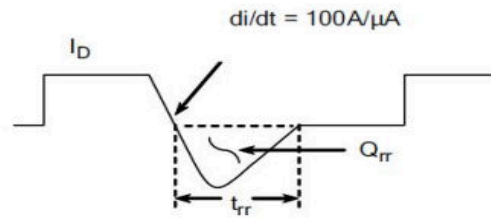


4) Resistive Switching Waveforms

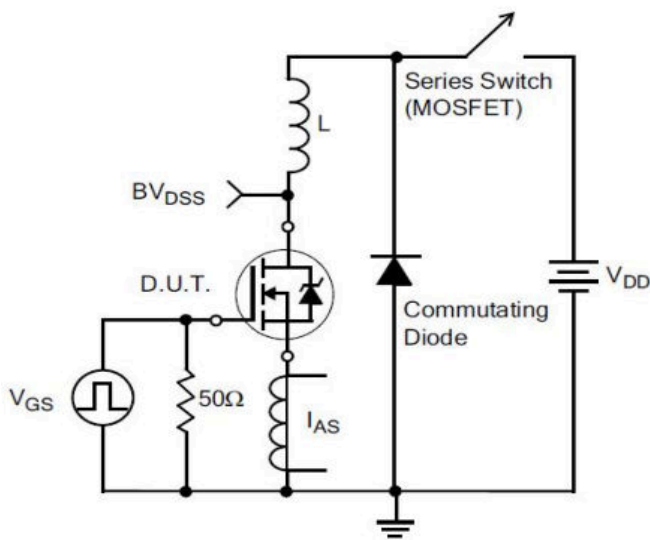
6 Typical Test Circuit and Waveform(continues)



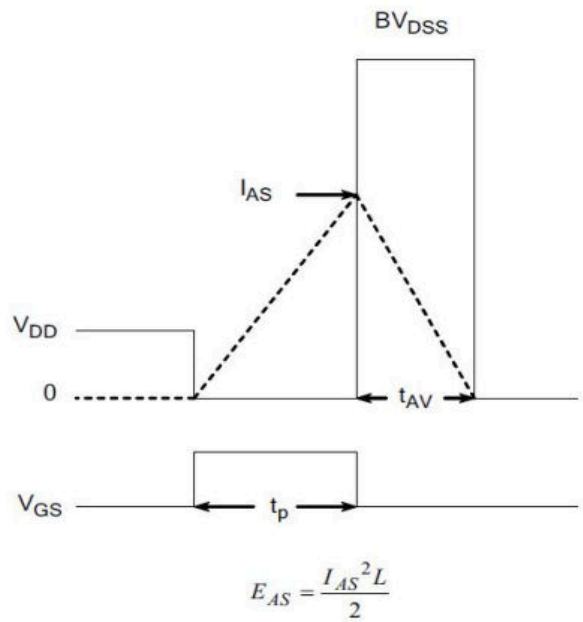
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

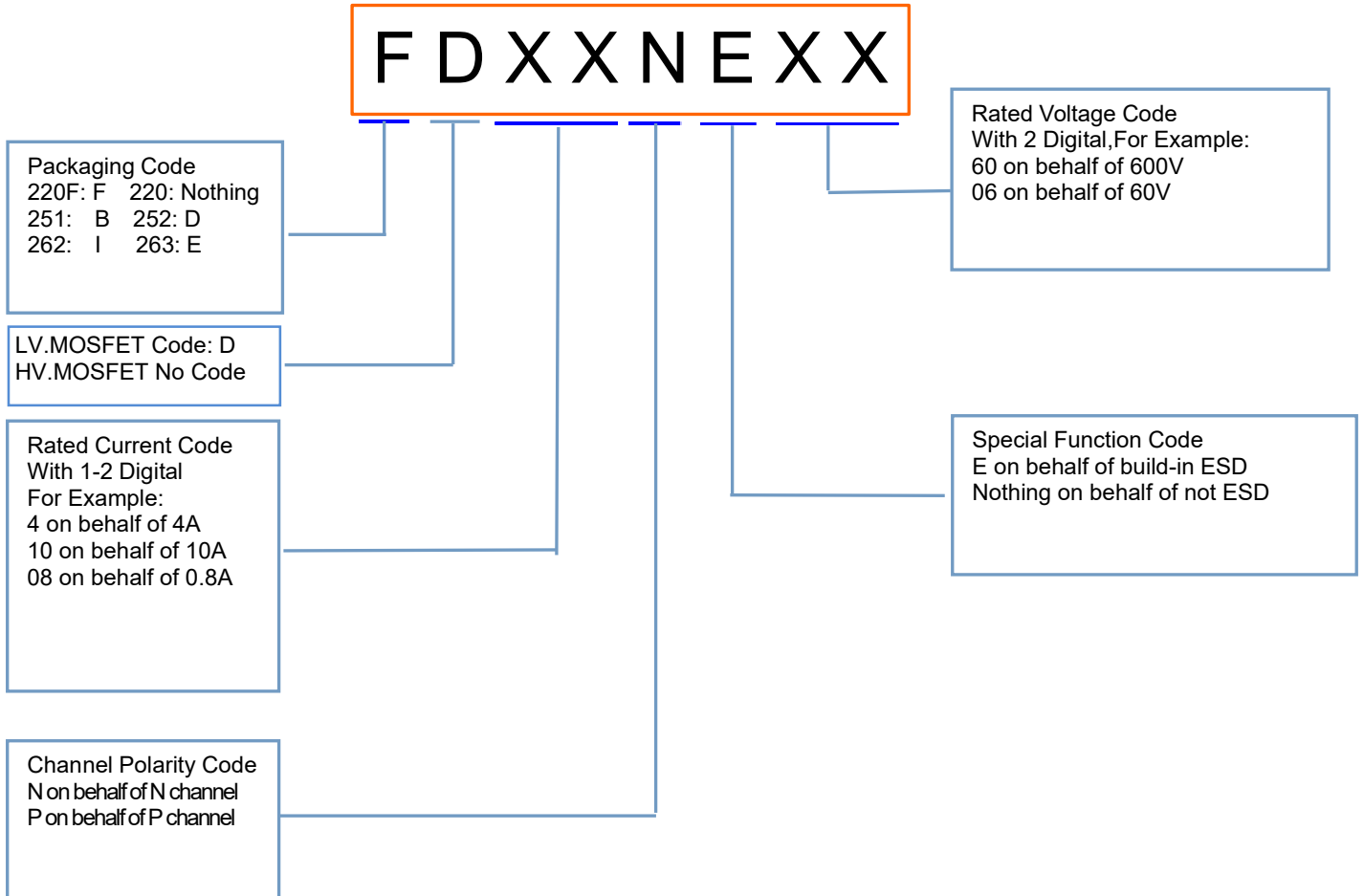


7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

7 Product Names Rules

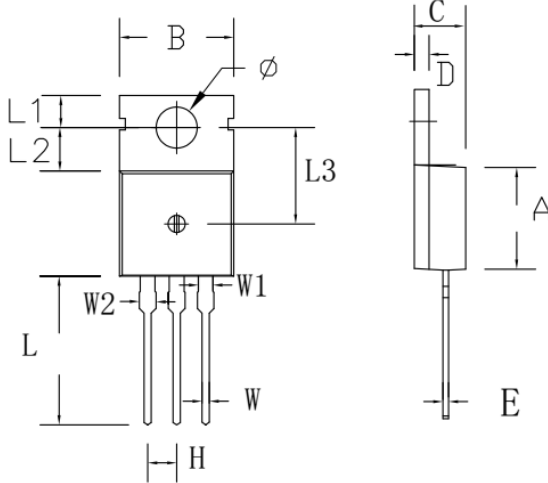


8 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	Indentification Code	RoHS	Package	Quantity
D3205Z5	TO-220C	D3205	Z5	Lead-free	Tube	1000/box
FD3205Z5	TO-220F	FD3205	Z5	Lead-free	Tube	1000/box
ID3205Z5	TO-262	ID3205	Z5	Lead-free	Tube	1000/box
ED3205Z5	TO-263	ED3205	Z5	Lead-free	Tape & Reel	800/box

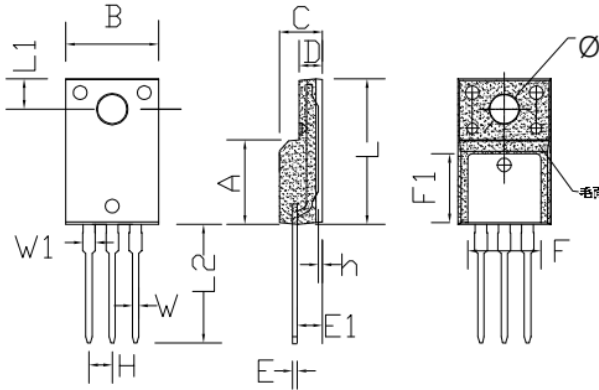
9 Dimensions

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

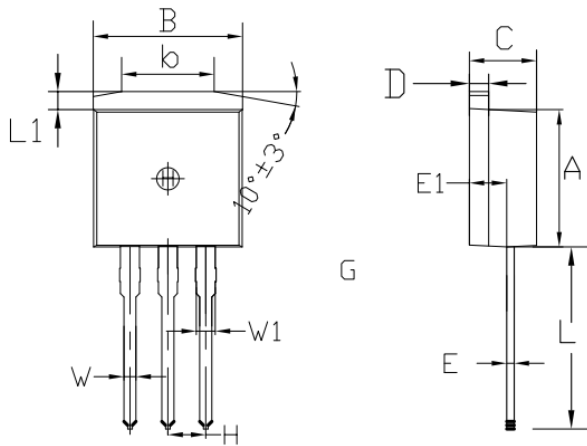
TO-220F PACKAGE OUTLINE DIMENSIONS



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

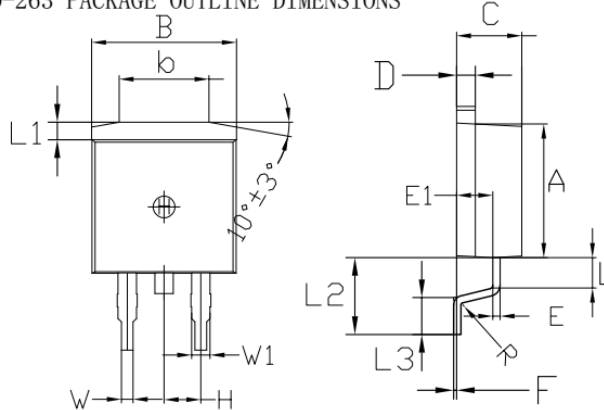
9 Dimensions(continues)

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

- 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
2017.03.17	1.0	Original	