BCX7N80

7A 800V N-channel Enhancement Mode Power MOSFET

V_{DSS} = 800V

$R_{DS(on)\ (TYP)}$= 1.5Ω

I_D = 7A

Description

These are N-channel enhancement mode power field effect transistors. It obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. Which accords with the RoHS standard.

Features

- Fast switching
- Low on resistance
- Low gate charge
- Low reverse transfer capacitances
- 100% single pulse avalanche energy test
- 100% ΔV_{DS} test

TO-220C

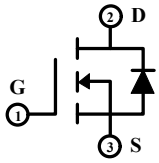
TO-220F

TO-263

TO-262

Applications

- LED power switch circuit
- Electronic ballast
- ATX power
- High voltage H bridge PWM motor drive



Electrical Characteristics

Absolute Maximum Ratin （T_C=25℃,unless otherwise noted）

Parameter		Symbol	Rating		Units
			7N80/I7N80/E7N80	F7N80	
Drian-to-Source Voltage		V_{DSS}	800		V
Gate-to-Source Voltage		V_{GSS}	±30		V
Continuous Drain Current	T_C=25℃	I_D	7		A
	T_C=100℃		4		A
Pulsed Drain Current(1)		I_{DM}	28		A
Single Pulse Avalanche Energy(4)		E_{AS}	150		mJ
Repetitive Avalanche Energy(4)		E_{AR}	20		mJ
Repetitive Avalanche Current(4)		I_{AR}	2		A
Peak Diode Recovery dv/dt(5)		dv/dt	5		V/ns
Power Dissipation	T_a=25℃	P_{tot}	2	2	W
	T_C=25℃	P_{tot}	120	48	W
Isolation Voltage		V_{ISO}	/	2500	V
Junction Temperature Range		T_j	-55～150		℃
Storage Temperature Range		T_{stg}	-55～150		℃
Maximum Temperature for soldering		T_L	300		℃

4.2 Thermal Characteristics

Parameter	Symbol	Rating		Unit
		7N80/I7N80/E7N80	F7N80	
Thermal Resistance,Junction to Case-sink	R_{thJC}	1.04	2.6	℃/W
Thermal Resistance,Junction to Ambient	R_{thJA}	62.5	62.5	℃/W

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	800	--	--	V
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=800V,V_{GS}=0V,T_C=25℃	--	--	25	μA
		V_{DS}=640V,V_{GS}=0V,T_C=125℃	--	--	250	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V	--	--	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2	--	4	V
Drain-to-Source on-state Resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=3.5A	--	1.5	1.8	Ω
Forward Transfer Conductance	g_{fs}	V_{DS}=15V,I_D=3.5A	--	7.5	--	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{GS}=0V,V_{DS}=25V,f=1.0MHz	--	1350	--	pF
Output Capacitance	C_{oss}		--	115	--	
Reverse Transfer Capacitance	C_{rss}		--	12	--	
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	I_D=7A, V_{DD}=400V, V_{GS}=10V, R_G=12Ω	--	15	--	nS
Turn-on Rise Time	t_r		--	25	--	
Turn-off Delay Time	$t_{d(off)}$		--	51	--	
Turn-off Fall Time	t_f		--	31	--	
Total Gate Charge	Q_g	I_D=7A,V_{DD}=400V,V_{GS}=10V	--	34	--	nC
Gate-to-Source Charge	Q_{gs}		--	6	--	
Gate-to-Drain(“Miller”) Charge	Q_{gd}		--	14	--	
Drain-Source Diode Characteristics						
Diode Forward Voltage(3)	V_{FSD}	V_{GS}=0V,I_S=7A	--	--	1.5	V
Diode Forward Current	I_S		--	--	7	A
Reverse Recovery Time(3)	t_{rr}	T_J=25℃,I_F=7A, dI_F/dt=100A/μS,V_{GS}=0V	--	186	--	nS
Reverse Recovery Charge(3)	Q_{rr}		--	878	--	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=5.5A,V_{DD}=50V,V_{GATE}=800V,Start T_J=25℃.

5. I_{SD}=7A,di/dt≤100A/μs,V_{DD}≤BV_{DSS}, Start T_J=25℃.

Typical characteristics diagrams

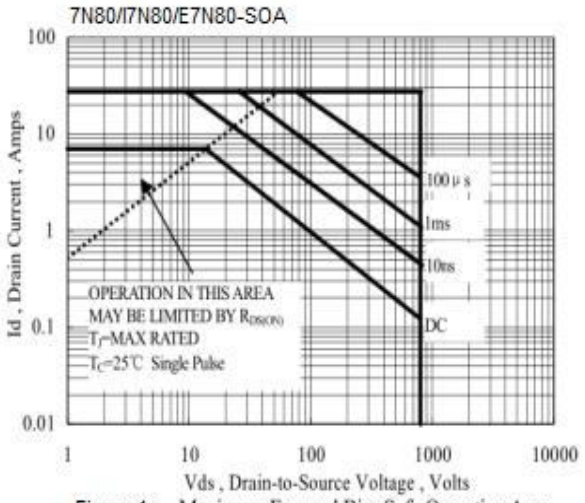


Figure 1a Maximum Forward Bias Safe Operating Area

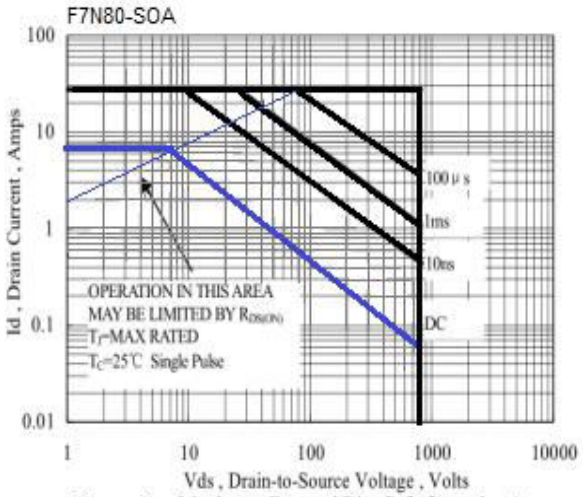


Figure 1b Maximum Forward Bias Safe Operating Area

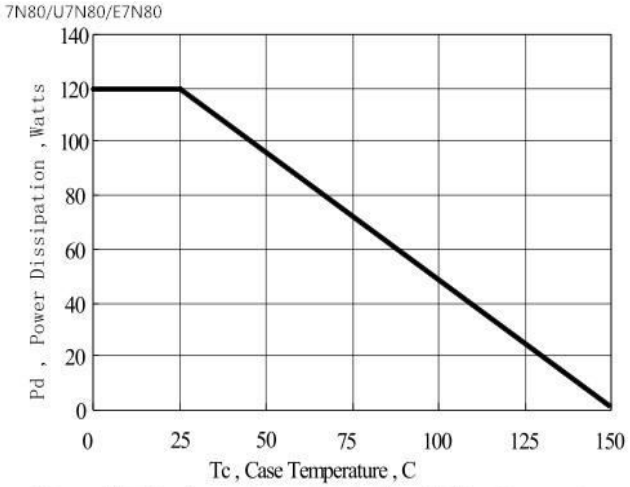


Figure.2(a) Maximum Power Dissipation VS Case Temperature

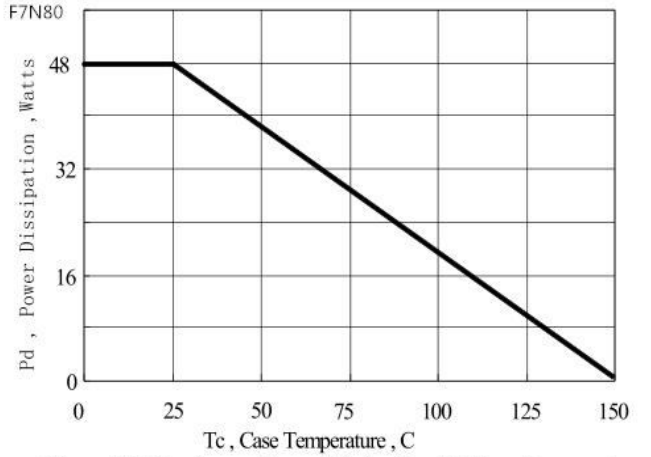


Figure.2(b) Maximum Power Dissipation VS Case Temperature

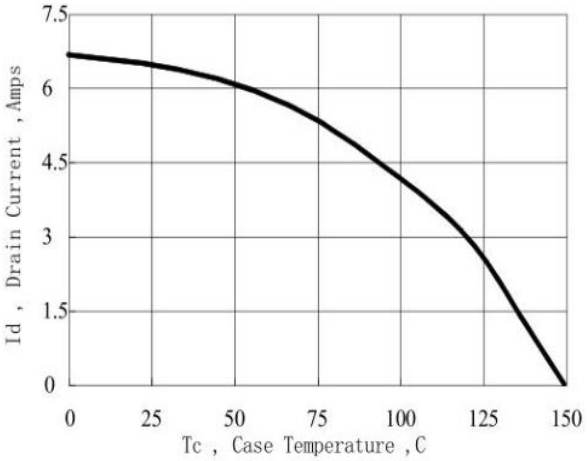


Figure 3 Maximum Continuous Drain Current vs Case Temperature

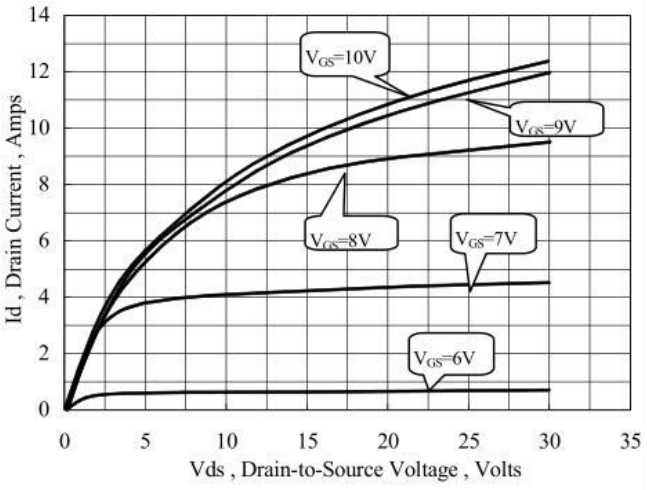


Figure 4 Typical Output Characteristics

Typical characteristics diagrams(continues)

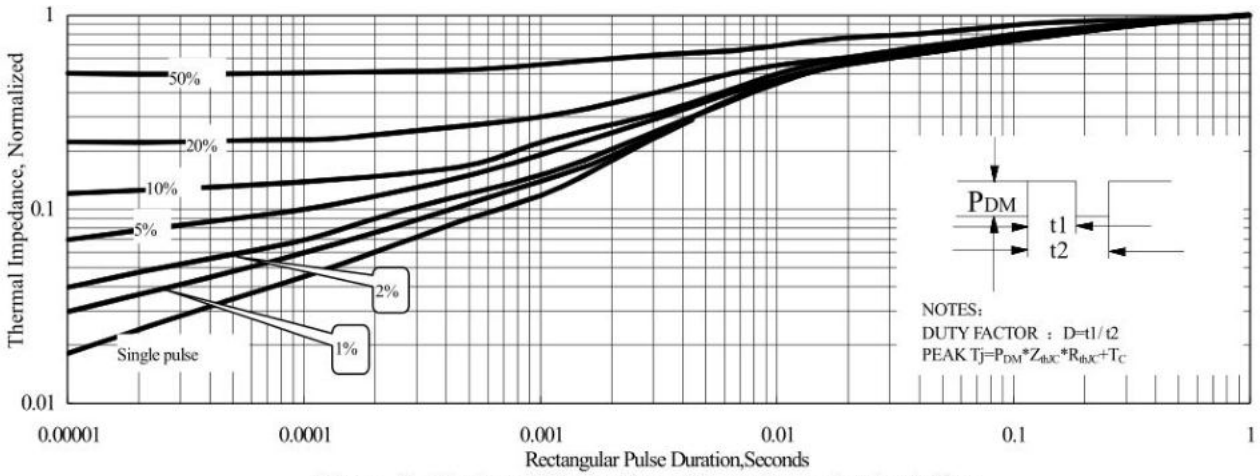


Figure 5 Maximum Effective Thermal Impendance , Junction to Case

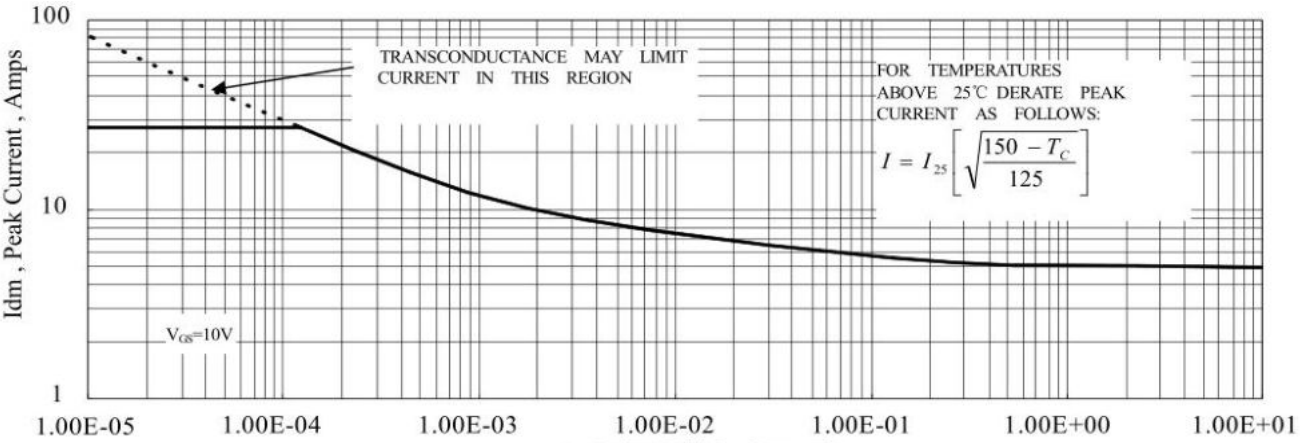


Figure 6 Maximun Peak Current Capability

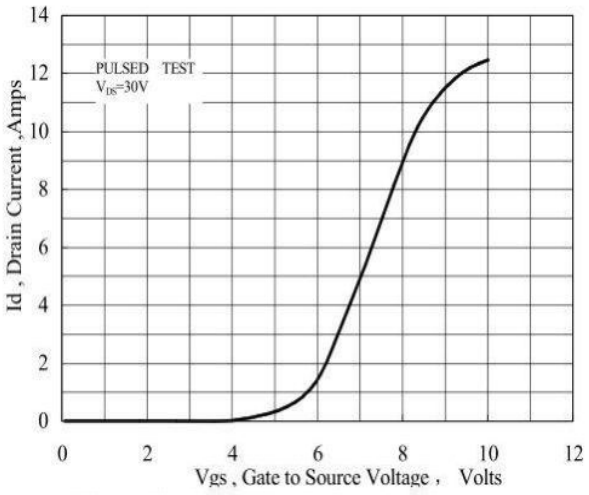


Figure 7 Typical Transfer Characteristics

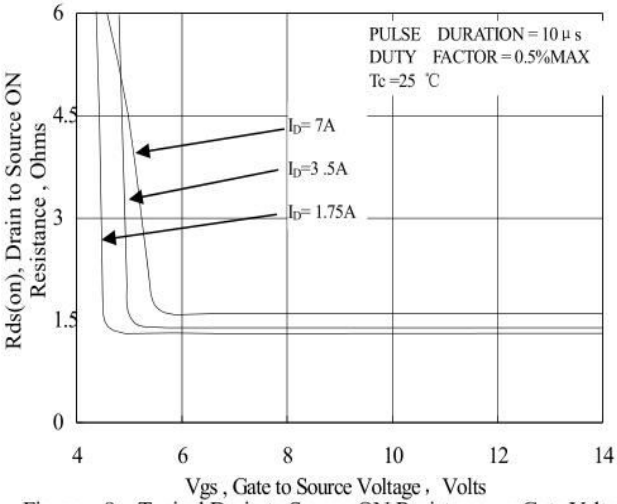


Figure 8 Typical Drain to Source ON Resistance vs Gate Voltage and Drain Current

5 Typical characteristics diagrams(continues)

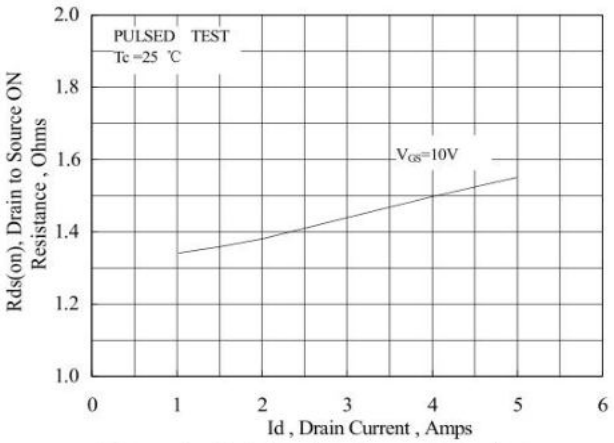


Figure 9 Typical Drain to Source ON Resistance vs Drain Current

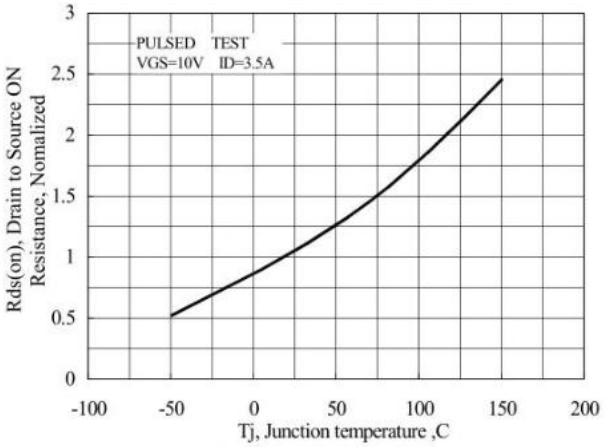


Figure 10 Typical Drian to Source on Resistance vs Junction Temperature

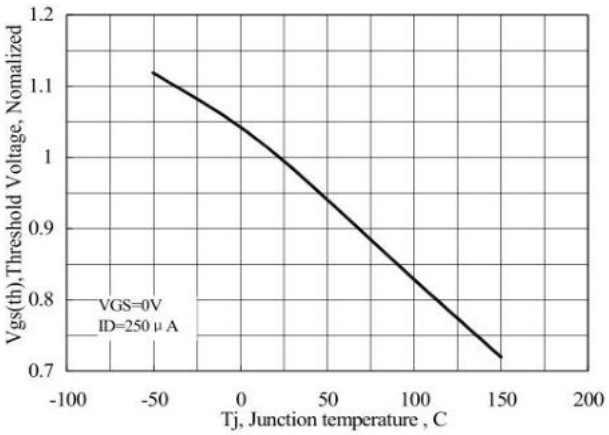


Figure 11 Typical Theshold Voltage vs Junction Temperature

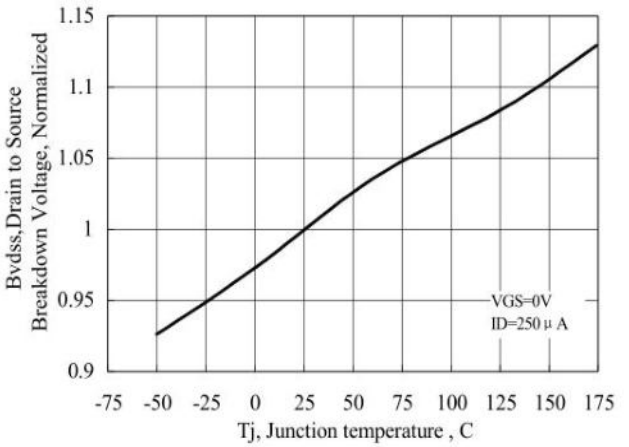


Figure 12 Typical Breakdown Voltage vs Junction Temperature

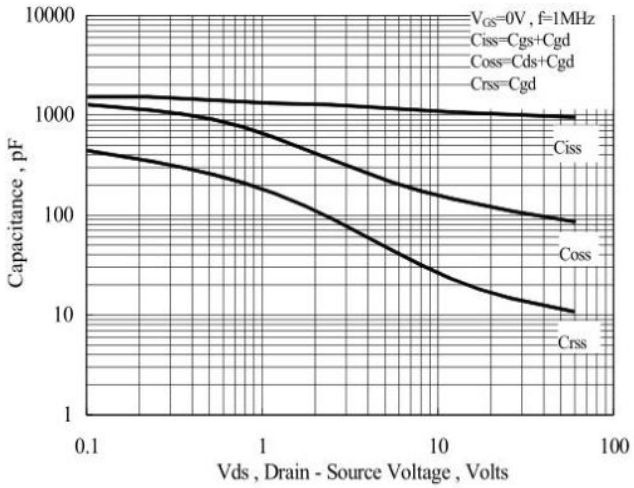


Figure 13 Typical Capacitance vs Drain to Source Voltage

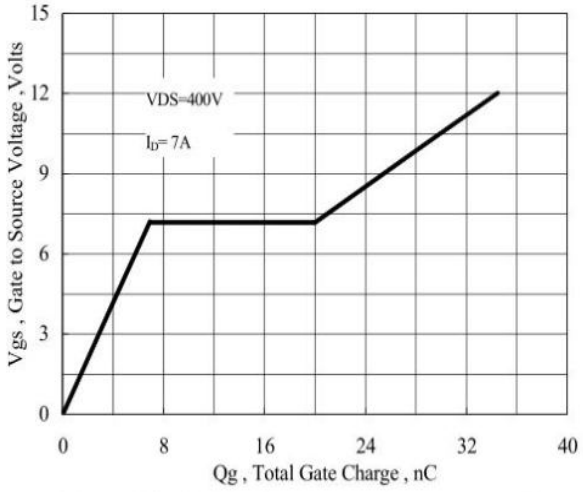


Figure 14 Typical Gate Charge vs Gate to Source Voltage

Typical characteristics diagrams(continues)

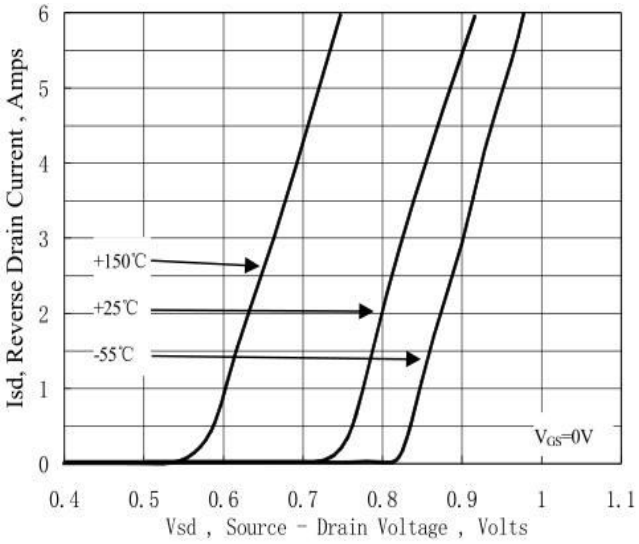


Figure 15 Typical Body Diode Transfer Characteristics

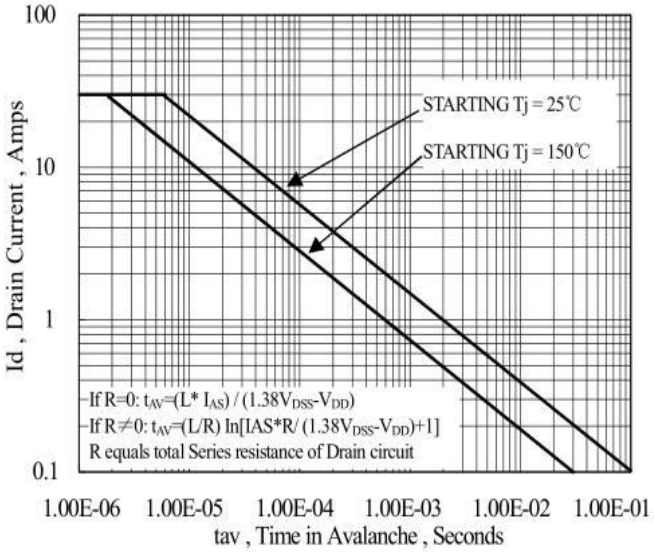
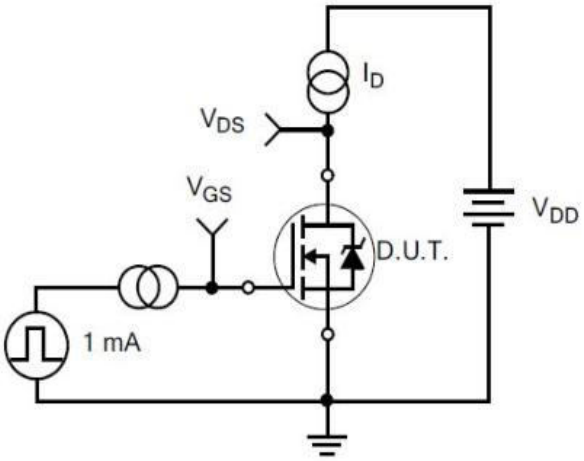
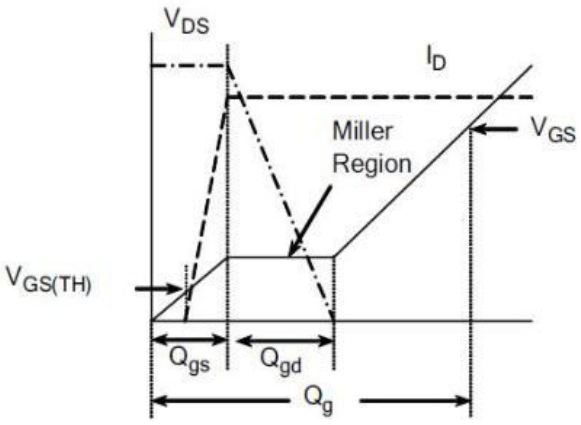


Figure 16 Unclamped Inductive Switching Capability

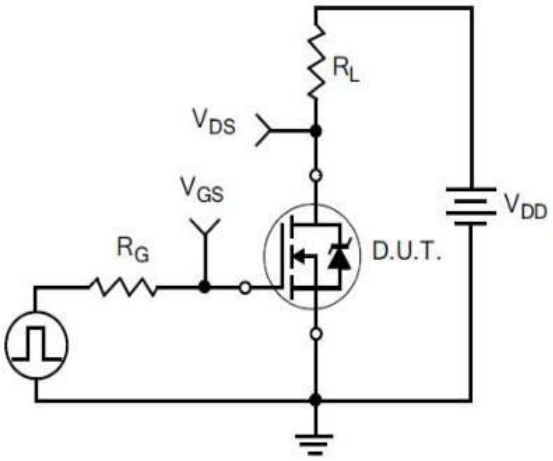
Typical Test Circuit and Waveform



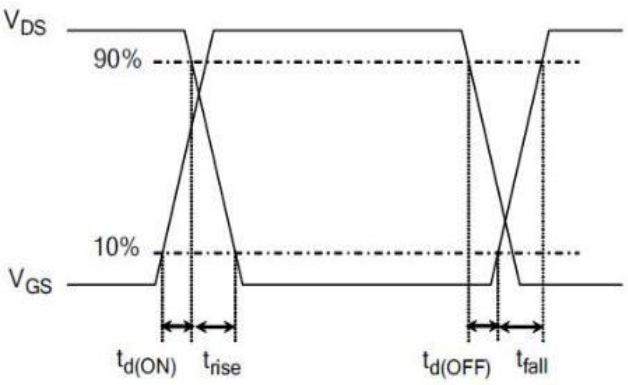
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

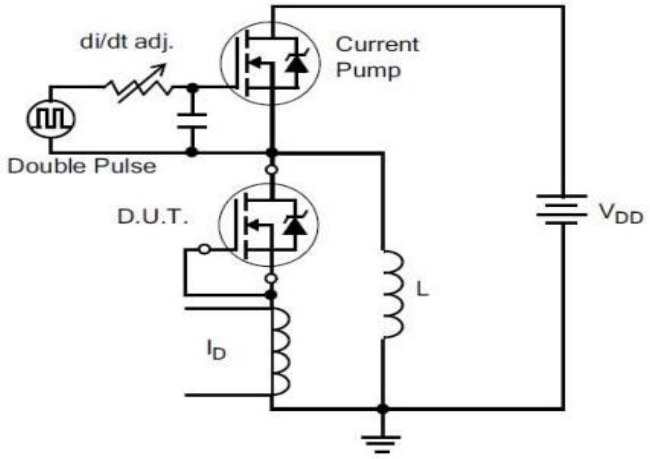


3) Resistive Switching Test Circuit

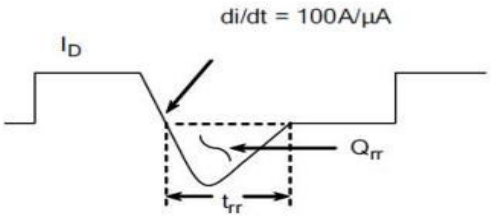


4) Resistive Switching Waveforms

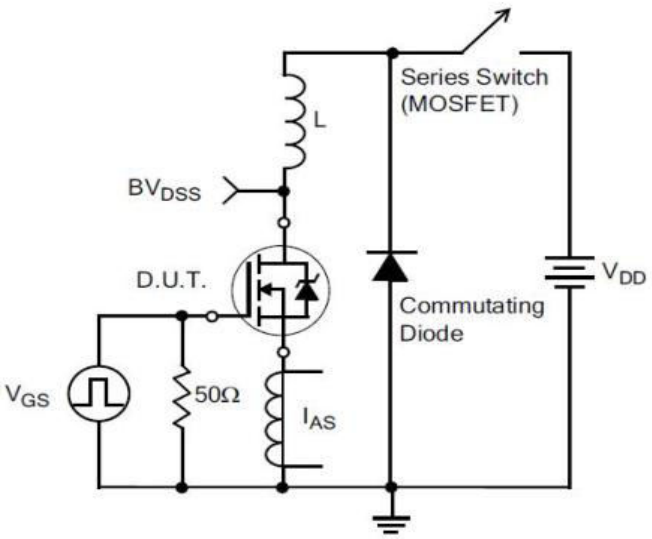
Typical Test Circuit and Waveform(continues)



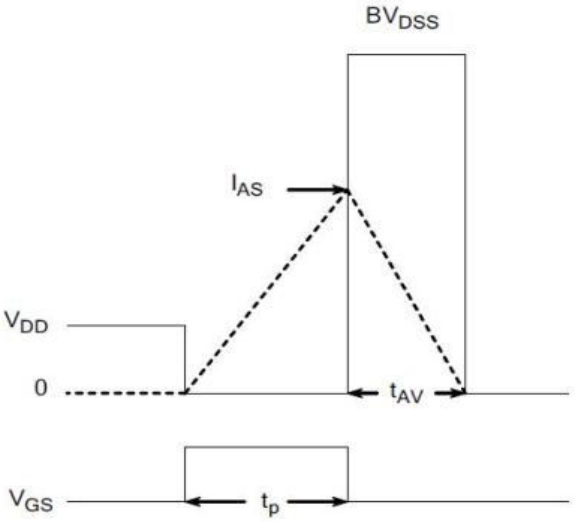
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



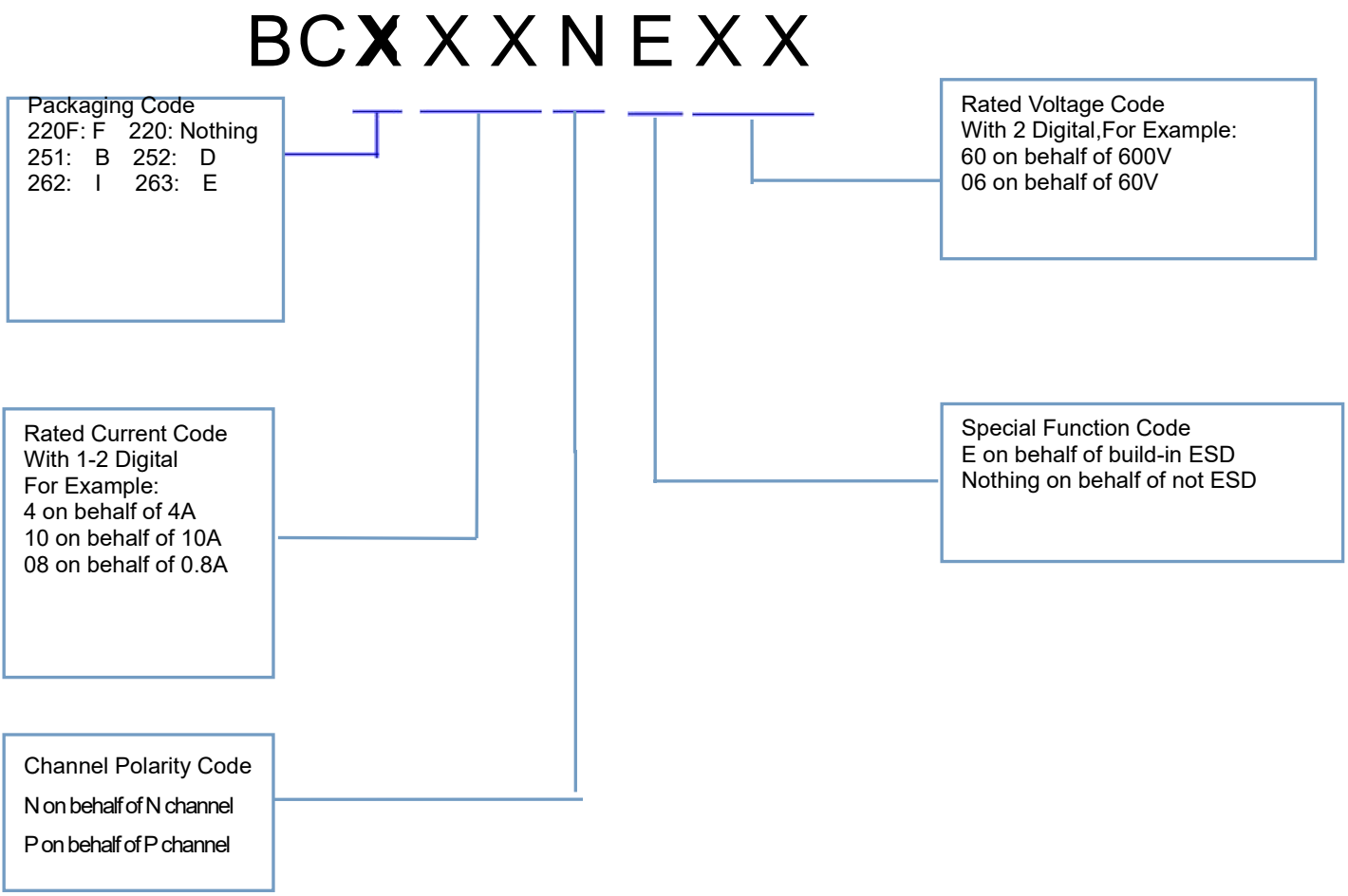
7) . Unclamped Inductive Switching Test Circuit



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

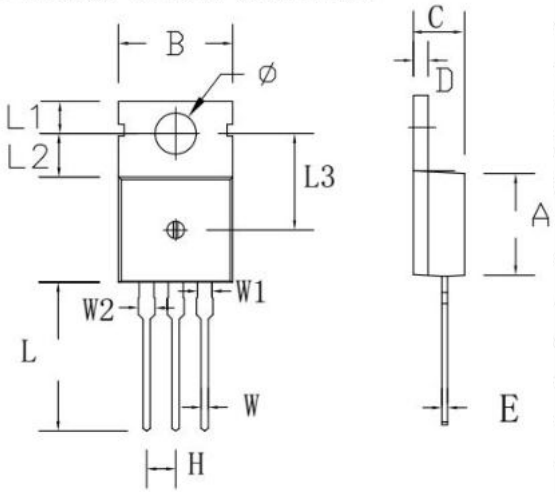
8) Unclamped Inductive Switching Waveforms

Product Names Rules



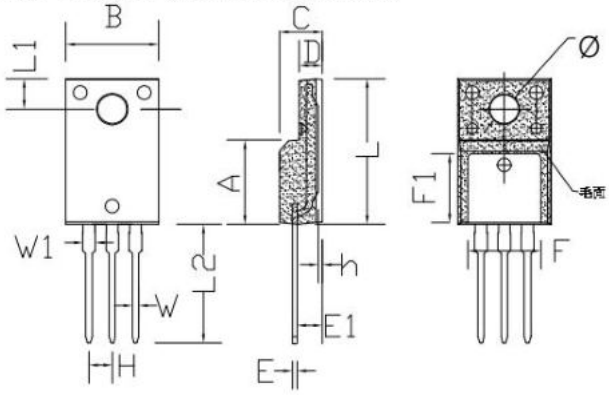
Dimensions

TO-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

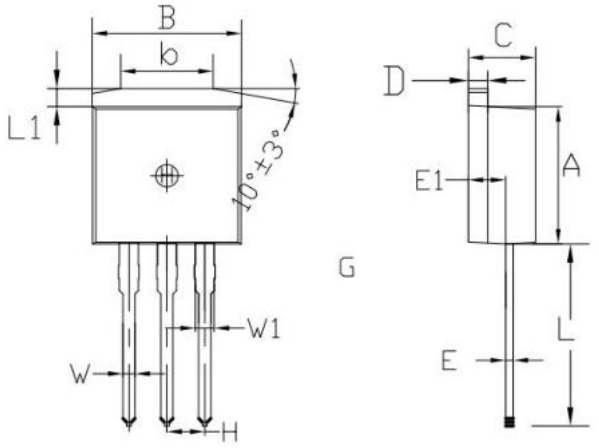
TO-220F PACKAGE OUTLINE DIMENSIONS



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

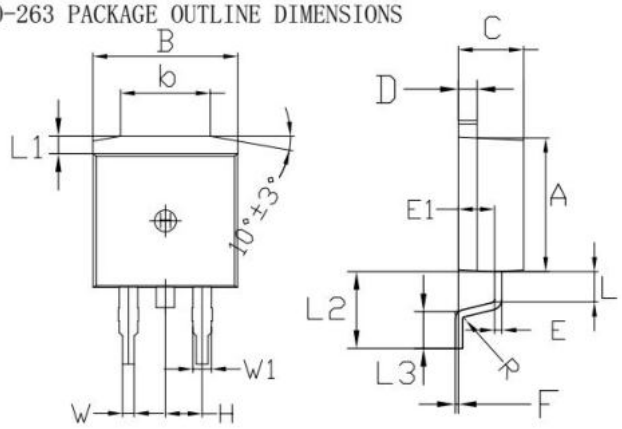
Dimensions(continues)

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