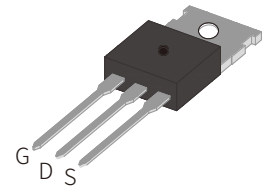


## FEATURES

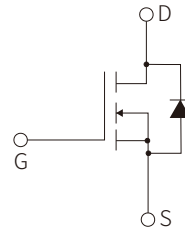
- | Low Gate Charge
- | Low Crss
- | Improved dv/dt Capability
- | Improved ESD Capability
- | 100% Avalanche energy test



TO-220C

## APPLICATION

- | High efficiency swith mode power supplies
- | Electronic lamp ballasts
- | UPS



Schematic Symbol

## APPROVALS

<b>RoHS</b>	Compliance with 2011/65/EU
<b>HF</b>	Compliance with IEC61249-2-21:2003

## ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	800	V
Continuous Drain Current	I <sub>D</sub>	T <sub>C</sub> =25°C	7
		T <sub>C</sub> =100°C	4.0
Pulsed Drain Current <sup>(note1)</sup>	I <sub>DM</sub>	28	A
Gate-Source Voltage	V <sub>GS</sub>	±30	V
Avalanche Current <sup>(note1)</sup>	I <sub>AR</sub>	7.0	A
Repetitive Avalanche Energy <sup>(note1)</sup>	E <sub>AR</sub>	18	mJ
Single Pulsed Avalanche Energy <sup>(note2)</sup>	E <sub>AS</sub>	418	mJ
Peak Diode Recovery <sup>(note3)</sup>	dv/dt	4.5	V/ns
Power Dissipation T <sub>C</sub> =25°C	P <sub>D</sub>	140	W
Power Dissipation Derating Factor Above 25°C	P <sub>D(DF)</sub>	1.12	W/°C
Maximum Temperature for Soldering	T <sub>L</sub>	300	°C
Operating Junction Temperature Range	T <sub>J</sub>	150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 to +150	°C
Thermal Resistance, Junction to Case	R <sub>thjc</sub>	0.89	°C/W
Thermal Resistance, Junction to Ambient	R <sub>thja</sub>	62.5	°C/W

\* Drain current limited by maximum junction temperature

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
<b>Off Characteristics</b>							
Drain-source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	800			V	
Breakdown voltage temperature coefficient	ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	I <sub>D</sub> =250μA, referenced to 25°C		0.7		V/°C	
Zero Gate Voltage Drain current	I <sub>DSS</sub>	V <sub>DS</sub> =800V, V <sub>GS</sub> =0V, T <sub>C</sub> =25°C			10	μA	
		V <sub>DS</sub> =640V, T <sub>C</sub> =125°C			100	μA	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =30V, V <sub>DS</sub> =0V			100	nA	
		V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V			-100	nA	
<b>On-Characteristics</b>							
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0		4.0	V	
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =3.5A			1.7	Ω	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =40V, I <sub>D</sub> =3.5A		5.0		S	
<b>Dynamic Characteristics</b>							
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f=1MHz		1200		pF	
Output capacitance	C <sub>oss</sub>				125		pF
Reverse Transfer capacitance	C <sub>rss</sub>				12		pF
Turn-on Delay Time	td(on)	V <sub>DD</sub> =400V, I <sub>D</sub> =7A, R <sub>G</sub> =25Ω (note 4,5)		35		ns	
Turn-On rise time	tr				100		ns
Turn-off Delay Time	td(off)				50		ns
Turn-off Fall time	tf				60		ns
Total gate charge	Q <sub>g</sub>				27		nC
Gate-source charge	Q <sub>gs</sub>	V <sub>DS</sub> =640V, I <sub>D</sub> =7A, V <sub>GS</sub> =10V (note 4,5)			8.2	nC	
Gate-drain charge	Q <sub>gd</sub>				11		nC
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>				7	A	
Maximum Pulsed Drain-Source Diode Forward Current	I <sub>SM</sub>				28	A	
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =7A, V <sub>GS</sub> =0V			1.4	V	
Reverse recovery time	T <sub>rr</sub>	I <sub>S</sub> =7A, V <sub>GS</sub> =0V, di <sub>F</sub> /dt=100A/μs(note 4)		650		ns	
Reverse recovery Charge	Q <sub>rr</sub>				7.0		uC

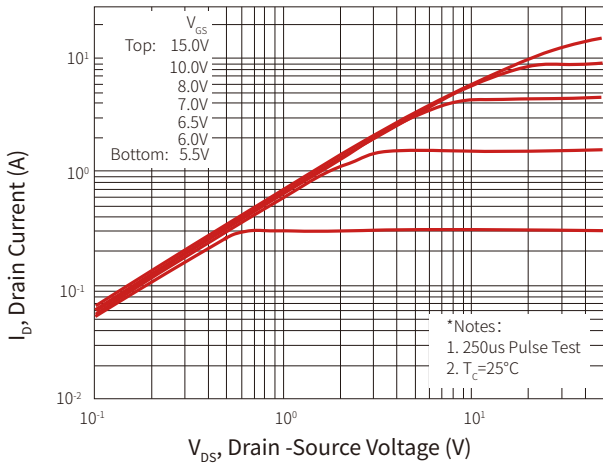
**Notes:**

1: Pulse width limited by maximum junction temperature  
 3: I<sub>SD</sub> ≤ 7A, di/dt ≤ 300A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub>=25°C  
 5: Essentially independent of operating temperature

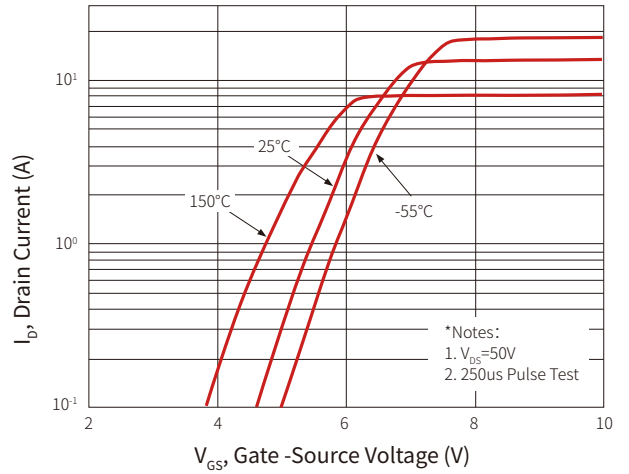
2: L=16mH, I<sub>AS</sub>=7A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C  
 4: Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%

# CHARACTERISTIC CURVES

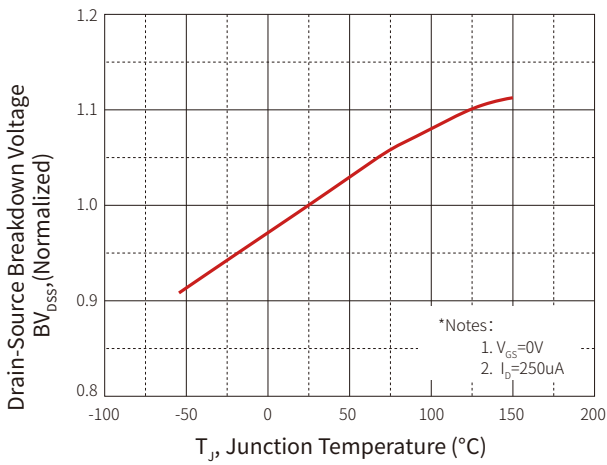
**Fig.1 On-State Characteristics**



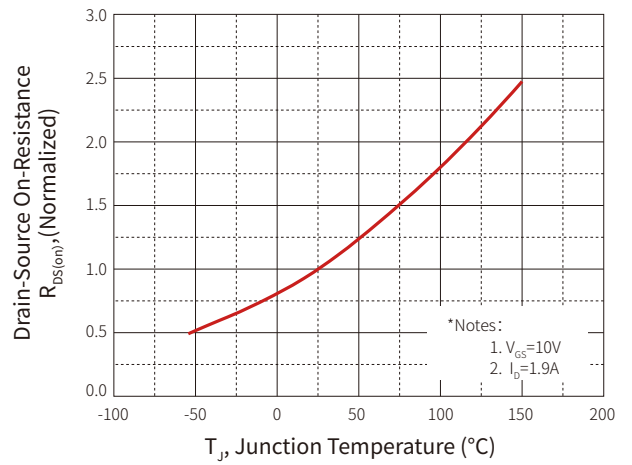
**Fig.2 Transfer Characteristics**



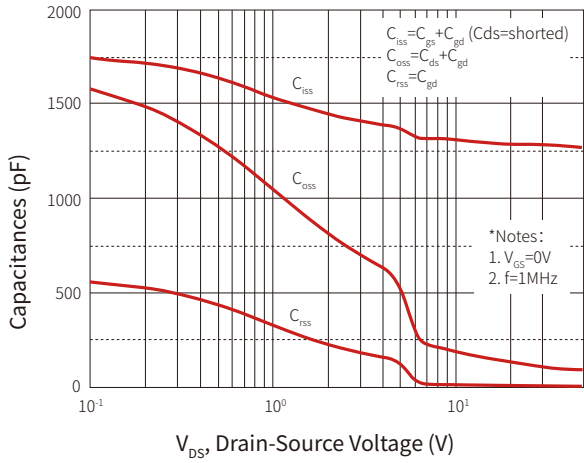
**Fig.3 Breakdown Voltage Variation vs Temperature**



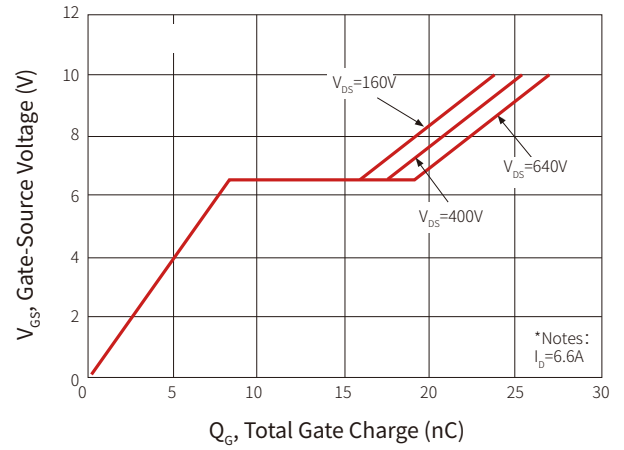
**Fig.4 On-Resistance Variation vs Temperature**



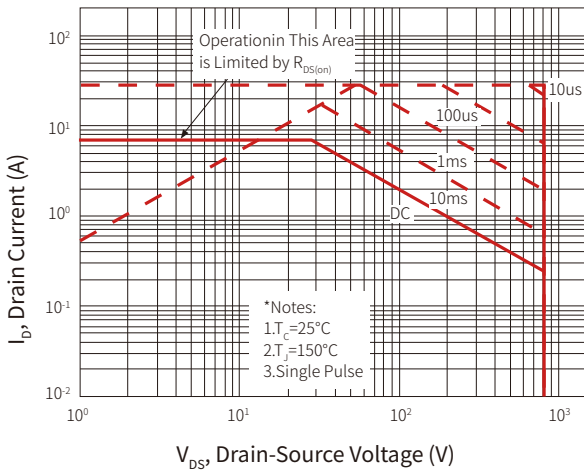
**Fig.5 Capacitance Characteristics**



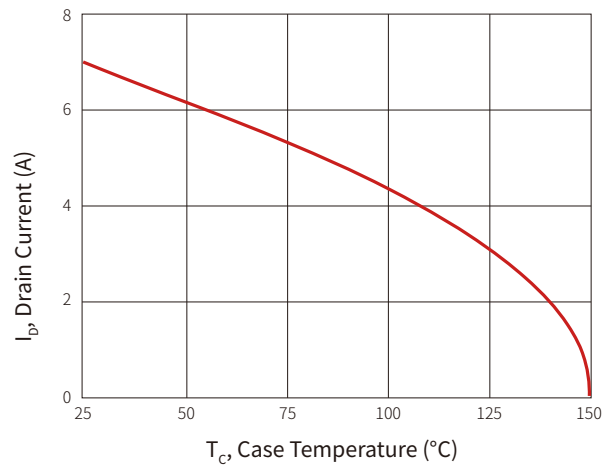
**Fig. 6 Gate Charge Characteristics**



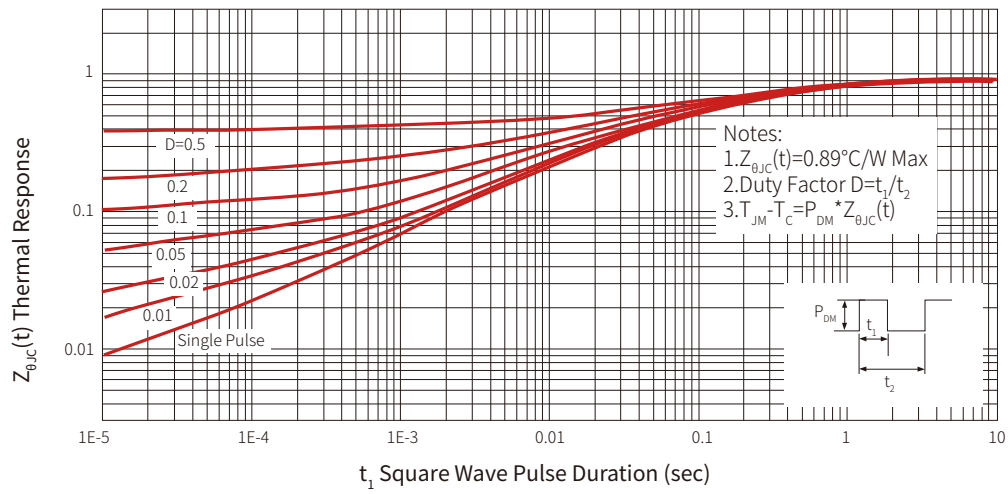
**Fig.7 Maximum Safe Operating Area**



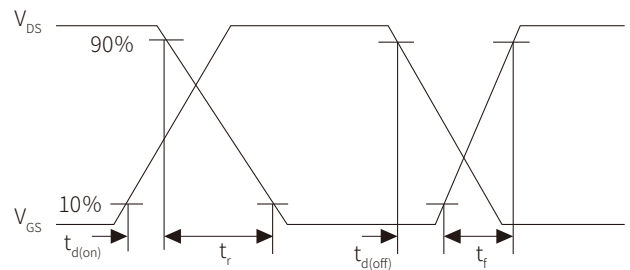
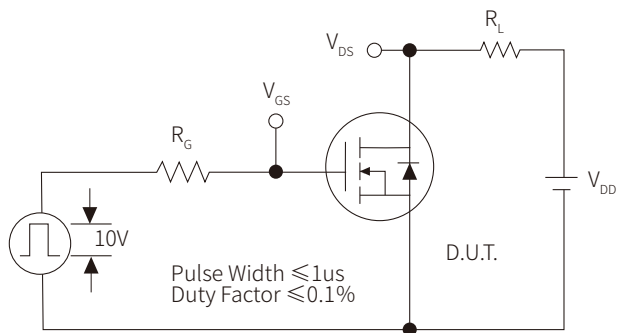
**Fig.8 Maximum Drain Current vs Case Temperature**



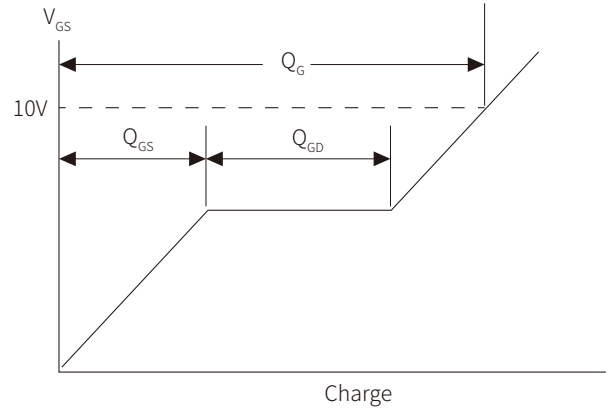
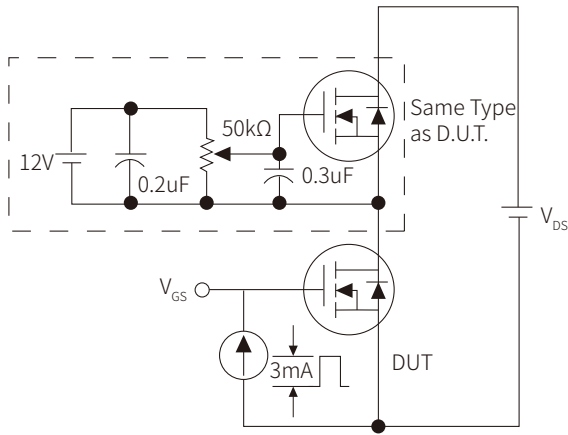
**Fig.9 Transient Thermal Response Curve**



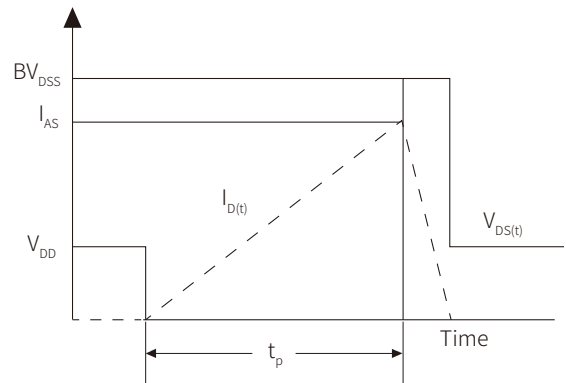
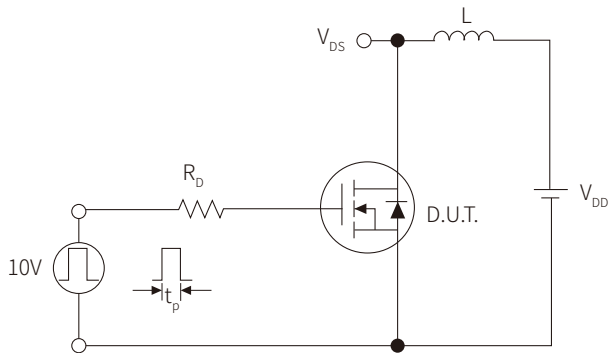
**Fig.10 Resistive Switching Test Circuit & Waveforms**



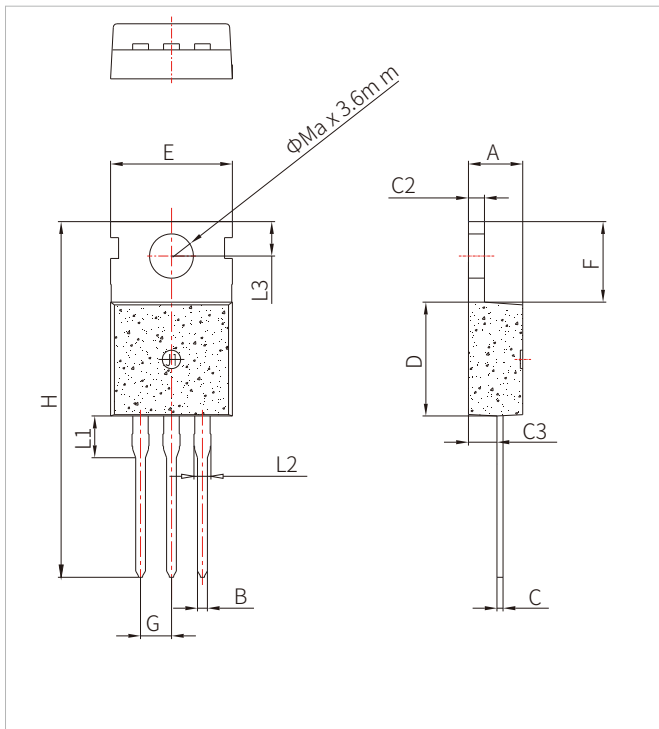
**Fig.11 Gate Charge Test Circuit & Waveform**



**Fig.12 Unclamped Inductive Switching Test Circuit & Waveforms**




## TO-220C PACKAGE MECHANICAL DATA



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.70	0.169		0.185
B	0.70		0.90	0.028		0.035
C	0.45		0.60	0.018		0.024
C2	1.23		1.32	0.048		0.052
C3	2.20		2.60	0.087		0.102
D	8.80		10.0	0.346		0.394
E	9.90		10.3	0.390		0.406
F	6.30		6.90	0.248		0.272
G		2.54			0.1	
H	28.0		30.0	1.102		1.181
L1		3.10			0.122	
L2	1.14		1.70	0.045		0.067
L3	2.65		2.95	0.104		0.116
$\Phi$		3.6			0.142	

## ORDERING INFORMATION

Part Number	Package	Marking	Qty/pcs		
			Tube	Inner Box	Carton
SNM7N80C	TO-220C	 7N80 XXXX	50	1000	5000

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