



PFC Device Corporation

PSM7N50CT

7.6A 500V Single N-Channel Power MOSFET

Major ratings and characteristics

Characteristics	Values	Units
$V_{DS@T_J \text{ max}}$	500	V
$R_{DS(ON), V_{GS}=10V}$	0.5	Ω
I_D	7.6	A

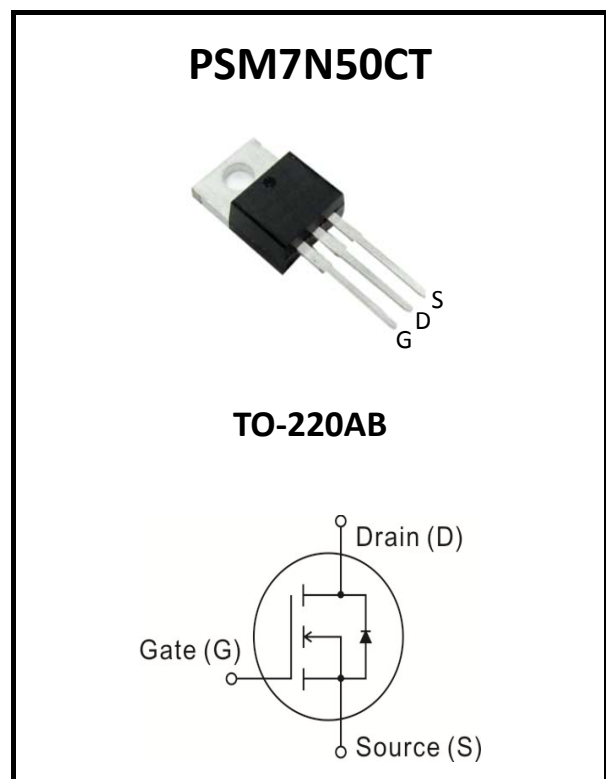
General Description

PFC MLSJ (Multi-Layer Super Junction) MOSFET technology is the ideal choice for the PFC and PWM application. PFC device provides practical advantages of higher pressure-resistance, lower on-resistance to achieve the ideal balance between the switching speed and on-resistance.

Typical Applications

PFC stages, hard switching PWM stages and resonant switching stages for PC, Adapter, LCD & PDP TV, Lighting, Server, Telecom and UPS.

Please note: For MOSFET paralleling the use of ferrite beads on the gate or separate totem poles is generally recommended.



Features

- Advanced High Voltage Technology
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Extreme dv/dt rated
- Lead Free Finish, RoHS Compliant

1. Characteristics

Maximum Ratings Characteristics

($T_A = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-Source Voltage	500	V
I_D	Drain Current – Continuous ($T_C=25^{\circ}\text{C}$)	7.6	A
	Drain Current – Continuous ($T_C=100^{\circ}\text{C}$)	4.6	A
$I_{Dpulsed}$	Pulsed Drain Current tp limited by T_{Jmax} (Note 1)	22.8	A
E_{AS}	Single Pulse Avalanche Energy(Noted 2)	230	mJ
I_{AR}	Avalanche Current, repetitive t_{AR} limited by T_{Jmax}	7.6	A
V_{GS}	Gate-Source Voltage Static	± 20	V
V_{GS}	Gate-Source Voltage AC ($f > 1\text{Hz}$)	± 30	V
P_{tot}	Power Dissipation	83	W
T_{STG}	Storage Temperature Range	-55 to 150	$^{\circ}\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}\text{C}$
dv/dt	Peak Diode Recovery dv/dt (Note 3)	15	V/nS

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	$^{\circ}\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction to case (Drain)	---	1.5	$^{\circ}\text{C/W}$



Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	500	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=500V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	0.5	1	μA
		$V_{DS}=500V, V_{GS}=0V, T_J=150^\circ\text{C}$	---	---	100	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=4.6A, T_J=25^\circ\text{C}$	---	0.45	0.5	Ω
		$V_{GS}=10V, I_D=4.6A, T_J=150^\circ\text{C}$	---	1.4	---	Ω
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=350\mu A$	2.1	3.0	3.9	V
R_G	Gate input resistance	f=1MHz, open Drain	---	0.87	---	Ω

Dynamic and switching Characteristics

Q_{gs}	Gate-Source Charge	$V_{DD}=400V, I_D=7.6A, V_{GS}=0$ to 10V	---	5	---	nC	
Q_{gd}	Gate-Drain Charge		---	13	---		
Q_g	Gate charge total		---	26	---		
g_{fs}	Transconductance	$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}, I_D=4.6A$	---	7	---	S	
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V,$	f=1MHz	---	780	pF	
C_{oss}	Output Capacitance	$V_{GS}=0V, V_{DS}=100V,$		---	42		---
C_{rss}	Reverse Transfer Capacitance	$V_{GS}=0V, V_{DS}=100V,$		---	26		---

Drain-Source Diode Characteristics and Maximum Ratings

V_{SD}	Inverse diode forward voltage	$I_S=7.6A, V_{GS}=0V$	---	1	1.2	V
t_{rr}	Reverse Recovery Time	$V_R=400V, I_F=7A, di_F/dt=100A/\mu S$	---	290	---	ns
Q_{rr}	Reverse Recovery Charge		---	3	---	μC
I_{rrm}	Peak reverse recovery current		---	20	---	A

Note :

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. $V_{DD}=50V, I_D=3.5A, \text{Starting } T_J=25^\circ\text{C}.$
3. $I_{SD} \leq I_D, di/dt \leq 400A/\mu s, T_J < T_{J,max}$



2. Characteristics Curves

Ratings and Characteristics Curves

($T_A = 25^\circ\text{C}$ unless otherwise specified)

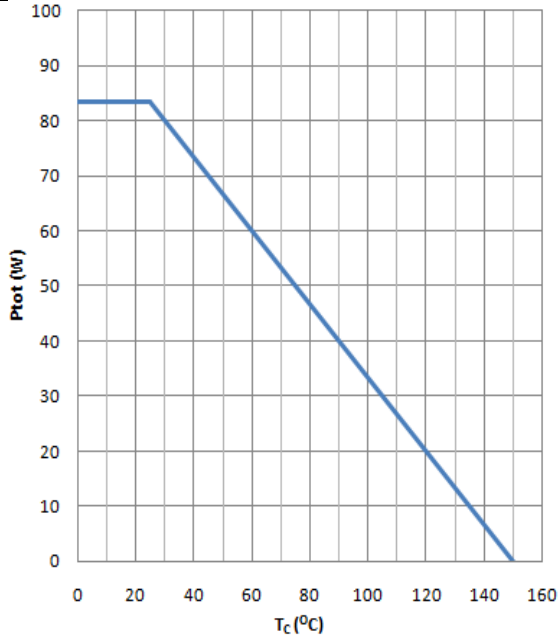


Figure 1: Power Dissipation
 $P_{tot} = f(T_c)$

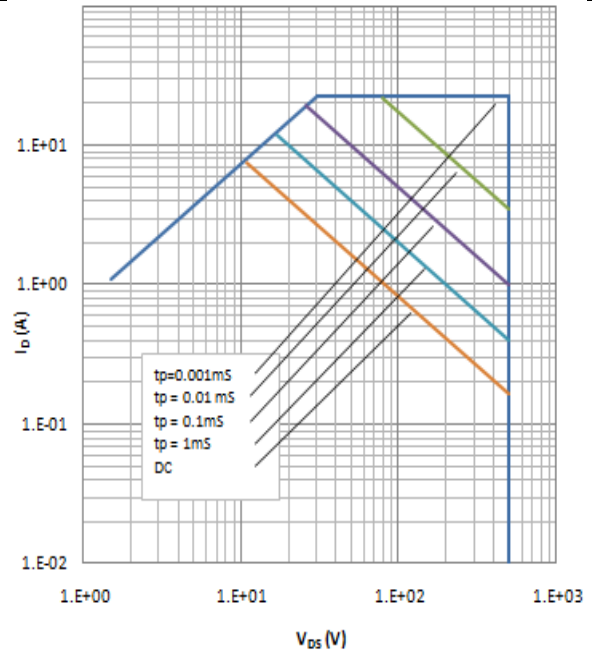


Figure 2: Safe operating area
 $I_D = f(V_{DS})$
 parameter : $D = 0, T_c = 25^\circ\text{C}$

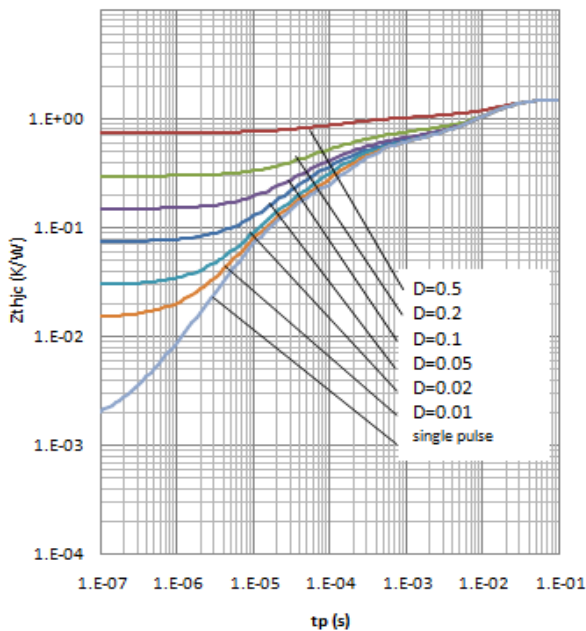


Figure 3: Transient thermal impedance
 $Z_{thjc} = f(tp)$
 parameter : $D = tp / T$

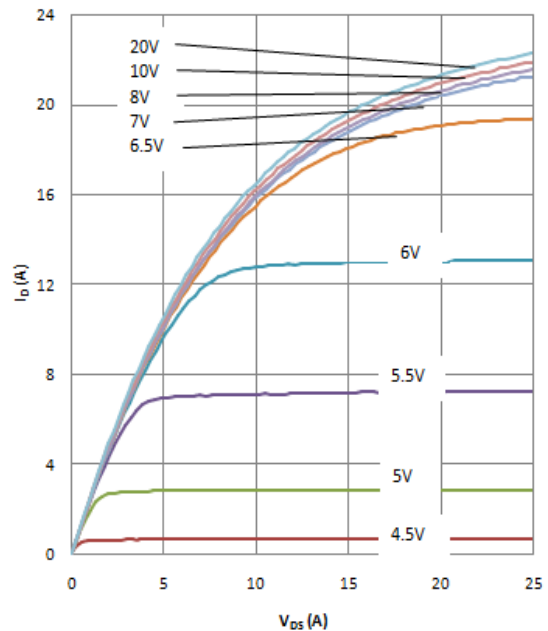


Figure 4: Typ. Output Characteristics
 $I_D = f(V_{DS}) ; T_j = 25^\circ\text{C}$
 parameter : $tp = 20\mu\text{s}, V_{GS}$



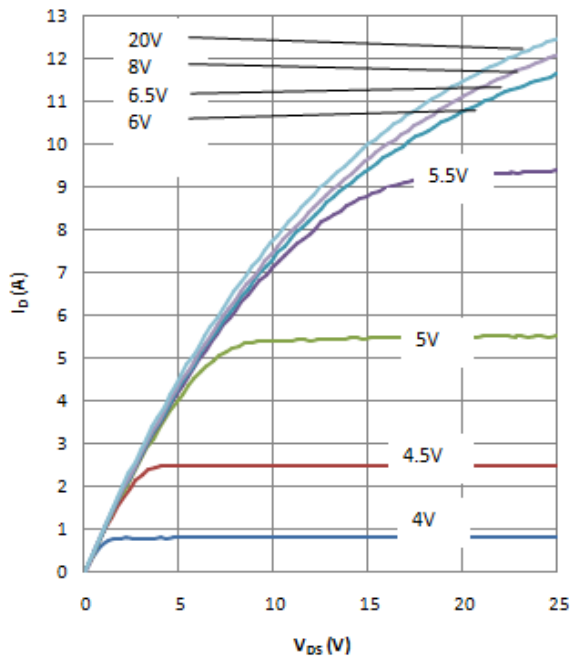


Figure 5:Typ. Output Characteristics
 $I_D = f(V_{DS})$; $T_j = 150^\circ\text{C}$
 parameter : $t_p = 20\mu\text{s}$, V_{GS}

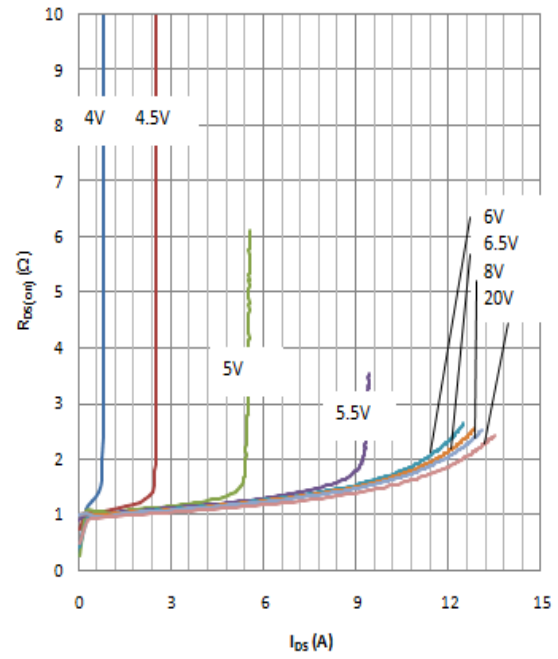


Figure 6: Typ. Drain Source On-Resistance
 $R_{DS(on)} = f(I_D)$
 parameter : $t_p = 20\mu\text{s}$, $T_j = 150^\circ\text{C}$, V_{GS}

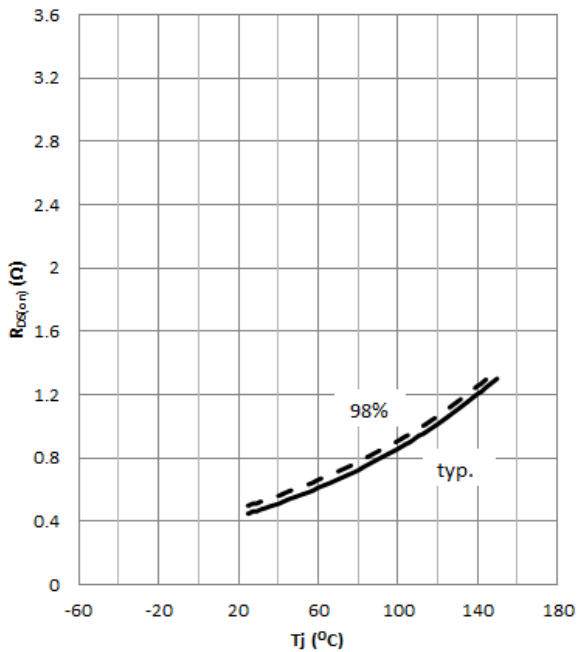


Figure 7: Drain-Source On-state Resistance
 $R_{DS(on)} = f(T_j)$
 parameter : $I_D = 4.6\text{A}$, $V_{GS} = 10\text{V}$

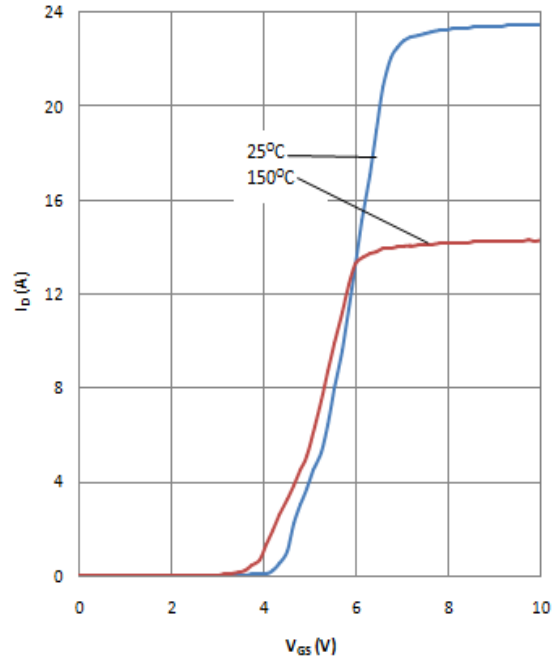


Figure 8: Typ. Transfer Characteristics
 $I_D = f(V_{GS})$; $V_{DS} \geq 2 \times I_D \times R_{DS(on) \text{ max}}$
 parameter : $t_p = 20 \mu\text{s}$



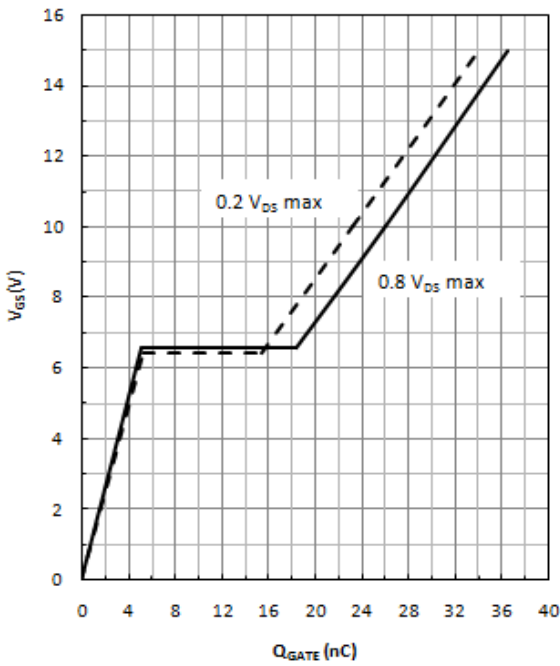


Fig 9: Typ. Gate Charge
 $V_{GS} = f(Q_{GATE})$
 parameter : $I_b = 7.6A$ pulsed

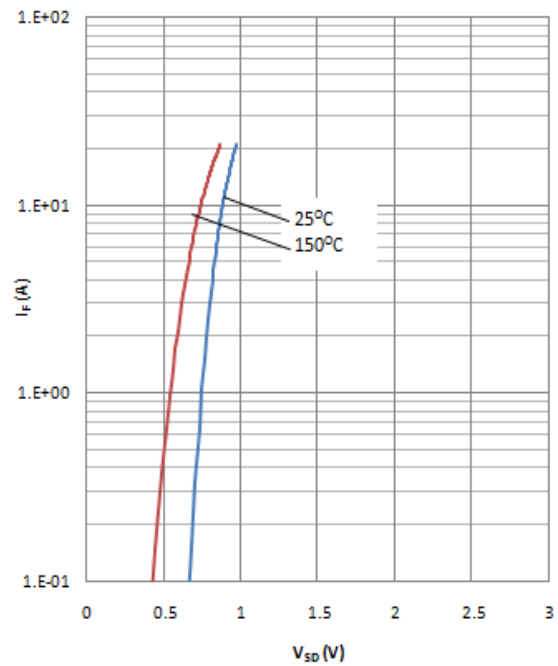


Fig 10: Forward characteristics of body diode
 $I_F = f(V_{SD})$
 parameter : T_j , $t_p = 20\mu s$

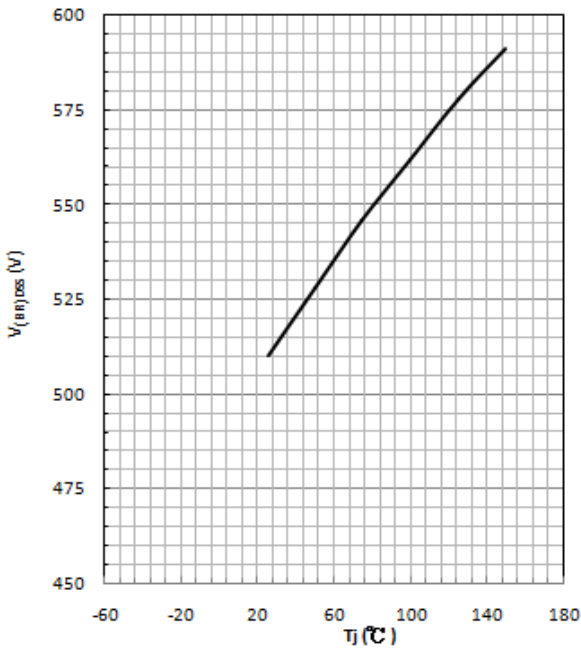


Fig 11: Drain-source breakdown voltage
 $V_{(BR)DSS} = f(T_j)$

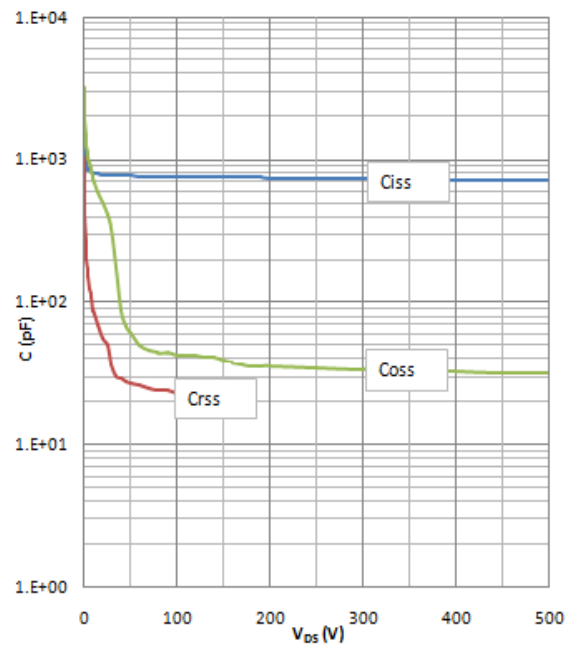


Fig 12: Typ. Capacitances
 $C = f(V_{DS})$
 parameter : $V_{GS} = 0V$, $f = 1MHz$



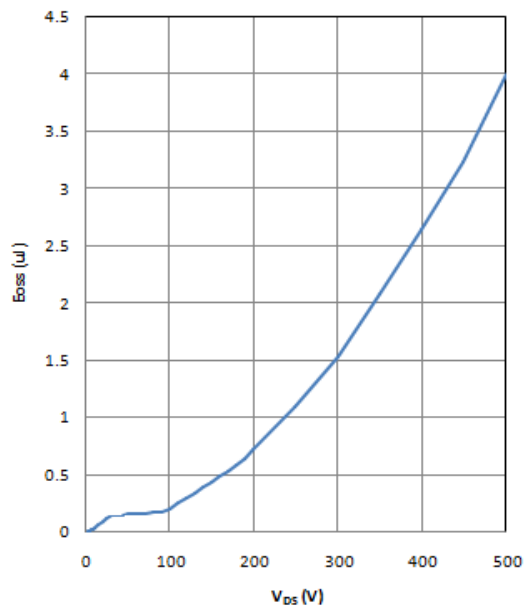


Fig 13: Typ. Coss stored energy

$E_{oss} = f(V_{Ds})$



3. Test Circuits and Waveforms

Test Circuits and Waveforms

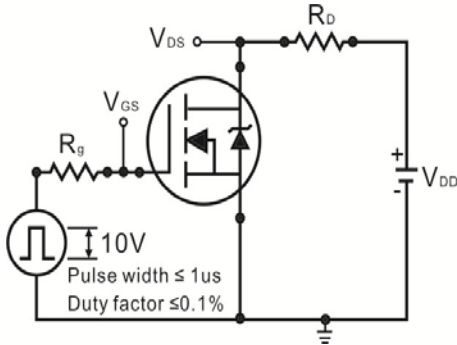


Figure 1: Switching times test circuit

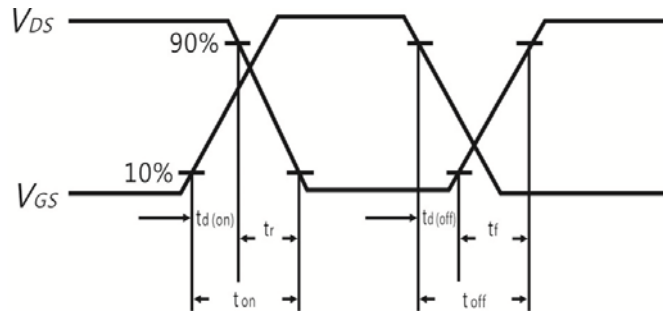


Figure 2: Switching time waveform

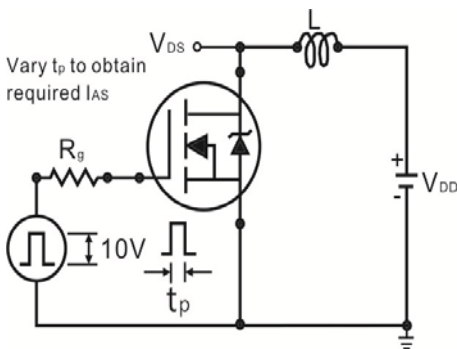


Figure 3: Unclamped test circuit

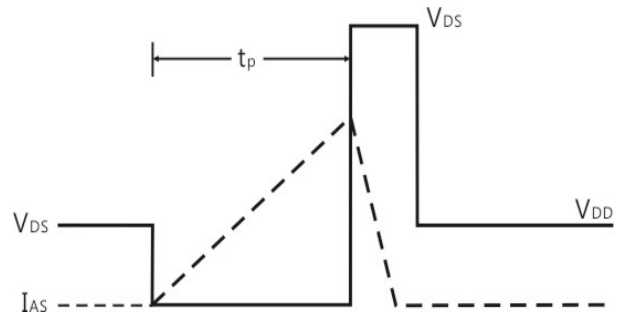


Figure 4: Unclamped test waveform

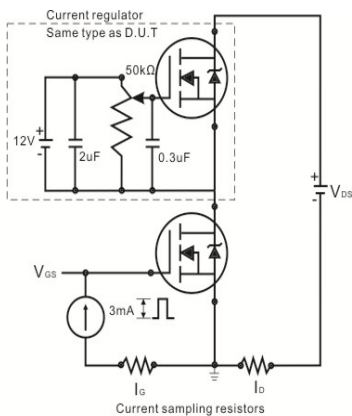


Figure 5: Gate charge test circuit

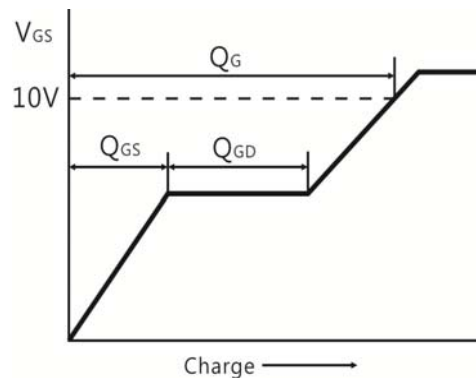
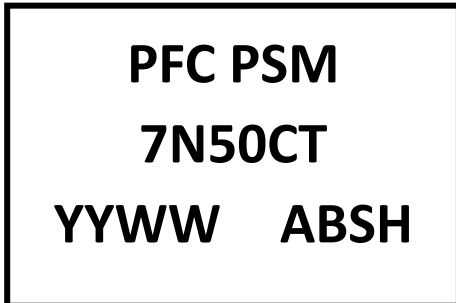


Figure 6: Basic gate charge waveform



4. Marking information

Top Marking Rule



PSM7N50CT = Product Type Marking Code

YY = Last two digits of year

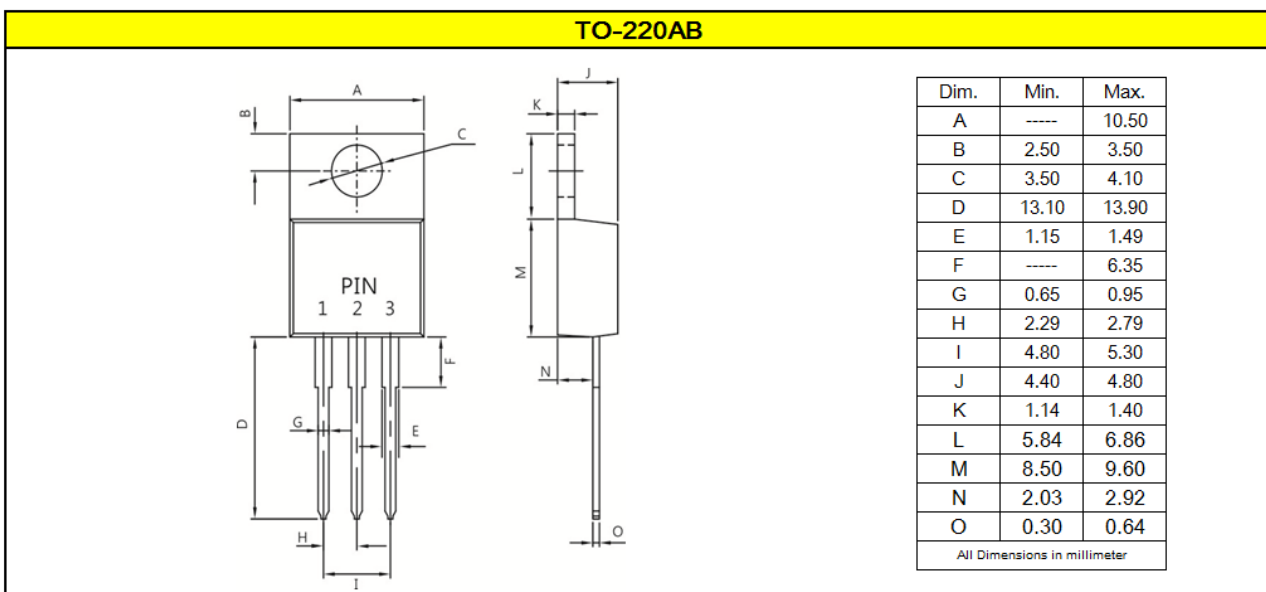
WW = Week code

ABS = Assembly code

H = Halogen Free (N/A = common molding compound)

5. Package information

Package Outline Dimensions millimeters



6. Ordering information

Part Number	Package	Delivery mode
PSM7N50CT	TO-220AB	50 pieces / tube

Note: For Halogen Free molding compound, add "H" suffix to part number above.

Mechanical

- Molder Plastic: UL Flammability Classification Rating 94V-0
- Device Weight : 0.07 ounces (1.96grams) – TO-220AB
- Mounting Torque : Recommended 10 in-lbs maximum

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