



PFC Device Corporation

PSM7N60CT

7.3A 600V Single N-Channel Power MOSFET

Major ratings and characteristics

Characteristics	Values	Units
$V_{DS@T_J \text{ max}}$	600	V
$R_{DS(ON), V_{GS}=10V}$	0.57	Ω
I_D	7.3	A

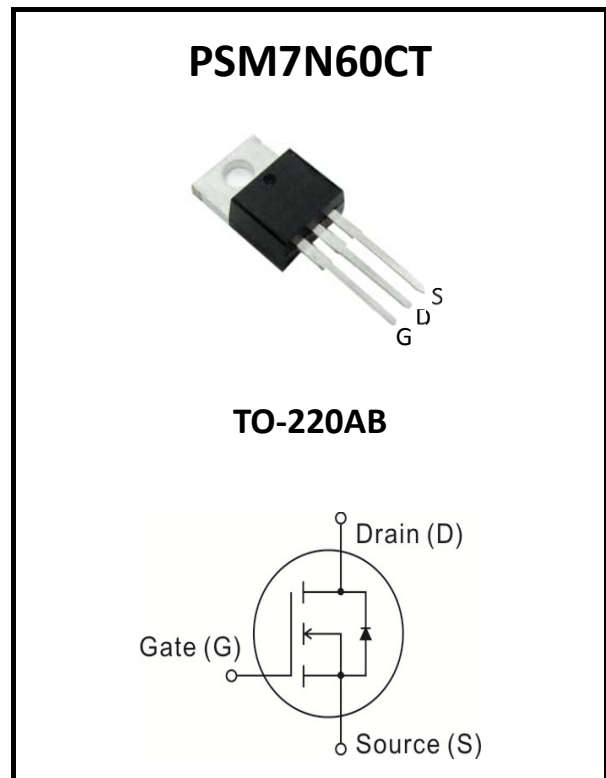
General Description

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	600	V
I_D	Drain Current – Continuous ($T_C=25^\circ\text{C}$)	7.3	A
	Drain Current – Continuous ($T_C=100^\circ\text{C}$)	4.6	A
$I_{D\text{ pulsed}}$	Pulsed Drain Current tp limited by T_J max (Note 1)	21.9	A
E_{AS}	Single Pulse Avalanche Energy (Noted 2)	230	mJ
I_{AR}	Avalanche Current, repetitive t_{AR} limited by T_J max	7.3	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	$V_{GS}=0V, I_D=250\mu A$	600	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=600V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	0.5	1	μA
		$V_{DS}=600V, V_{GS}=0V, T_J=150^\circ\text{C}$	---	---	100	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=4.6A, T_J=25^\circ\text{C}$	---	0.5	0.57	Ω
		$V_{GS}=10V, I_D=4.6A, T_J=150^\circ\text{C}$	---	1.42	---	Ω
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=350\mu A$	2.1	3.3	3.9	V
R_G	Gate input resistance	f=1MHz, open Drain	---	0.86	---	Ω

Dynamic and switching Characteristics

Q_{gs}	Gate-Source Charge	$V_{DD}=480V, I_D=7.3A, V_{GS}=0$ to 10V	---	5.1	---	nC	
Q_{gd}	Gate-Drain Charge		---	13.2	---		
Q_g	Gate charge total		---	21	28		
g_{fs}	Transconductance	$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}, I_D=4.6A$	---	6.5	---	S	
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V,$	f = 1MHz	---	790	pF	
C_{oss}	Output Capacitance	$V_{GS}=0V, V_{DS}=100V,$		---	39		---
C_{rss}	Reverse Transfer Capacitance	$V_{GS}=0V, V_{DS}=100V,$		---	24		---

Drain-Source Diode Characteristics and Maximum Ratings

V_{SD}	Inverse diode forward voltage	$I_S=7.3A, V_{GS}=0V$	---	1	1.2	V
t_{rr}	Reverse Recovery Time	$V_R=480V, I_F=3.5A, di_F/dt=100A/\mu s$	---	250	350	ns
Q_{rr}	Reverse Recovery Charge		---	2.4	---	μC
I_{rrm}	Peak reverse recovery current		---	18	---	A

Note :

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. $V_{DD}=50V, I_D=3.5A$, 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

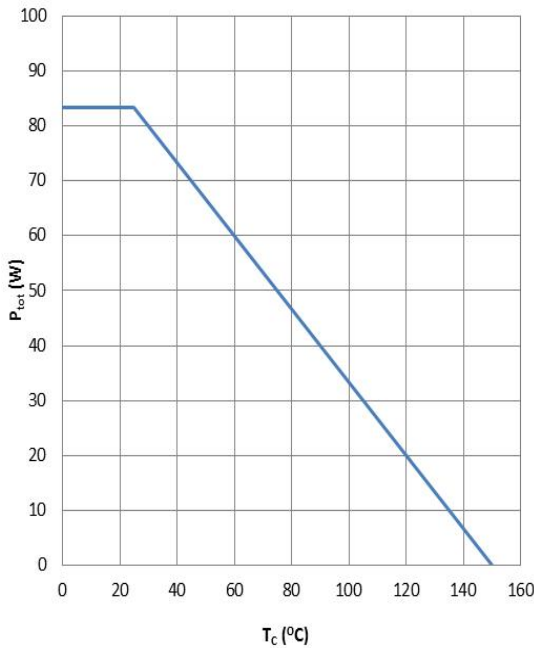


Fig 1: Power Dissipation

$P_{tot} = f(T_c)$

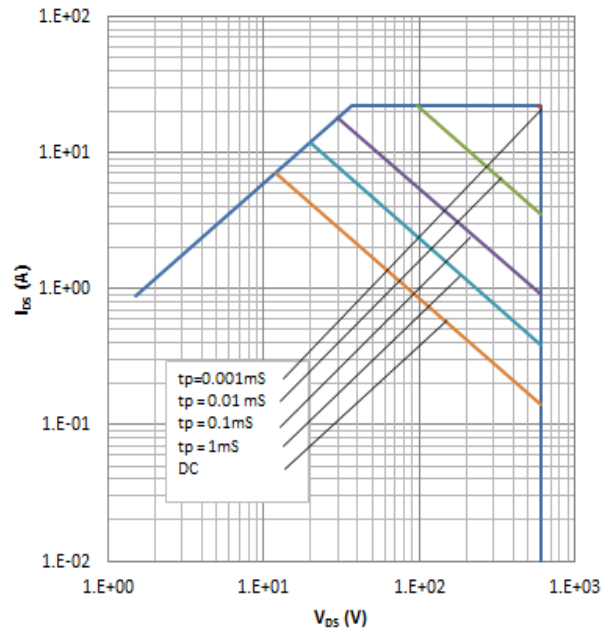


Fig 2: Safe operating area

$I_D = f(V_{DS})$

parameter : $D = 0, T_c = 25^\circ C$

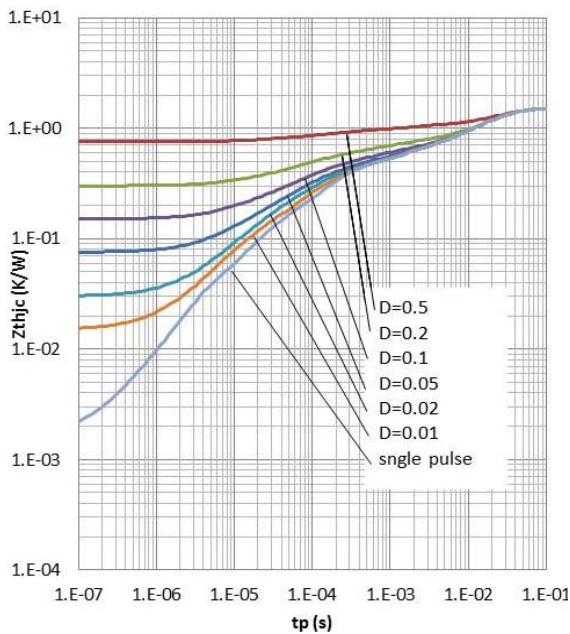


Fig 3: Transient thermal impedance

$Z_{thjC} = f(tp)$

parameter : $D = tp / T$

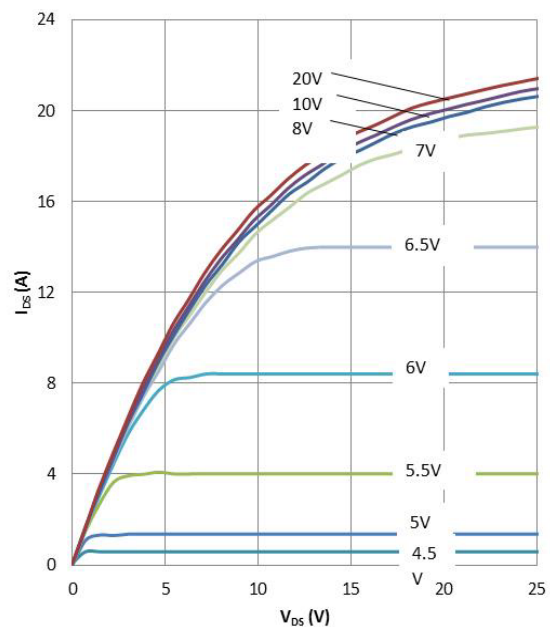


Fig 4: Typ. Output Characteristics

$I_D = f(V_{DS}) ; T_j = 25^\circ C$

parameter : $tp = 20\mu S, V_{GS}$



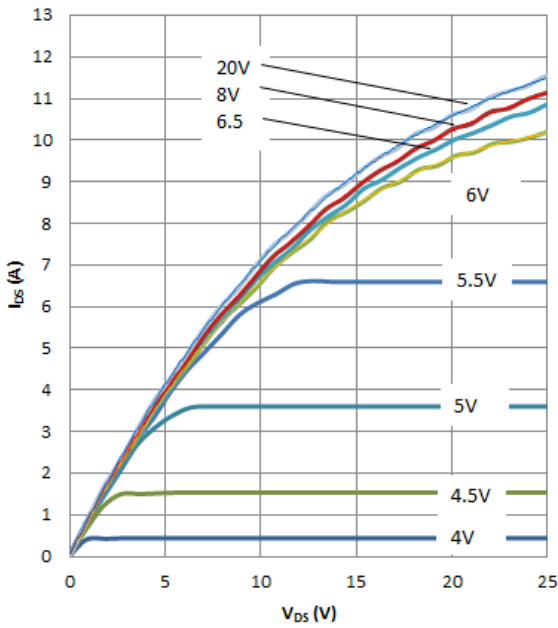


Fig 5: Typ. Output Characteristics

$I_D = f(V_{DS}) ; T_j = 150^{\circ}\text{C}$

parameter : $t_p = 20\mu\text{s}, V_{GS}$

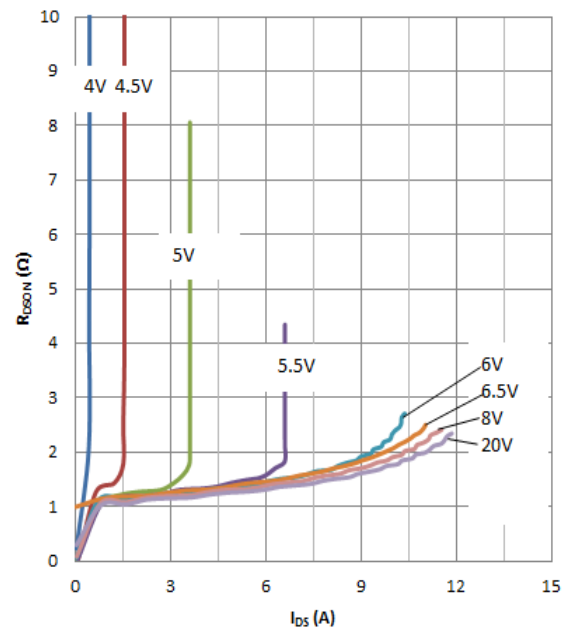


Fig 6: Typ. Drain Source On-Resistance

$R_{DS(on)} = f(I_D)$

parameter : $t_p = 20\mu\text{s}, T_j = 150^{\circ}\text{C}, V_{GS}$

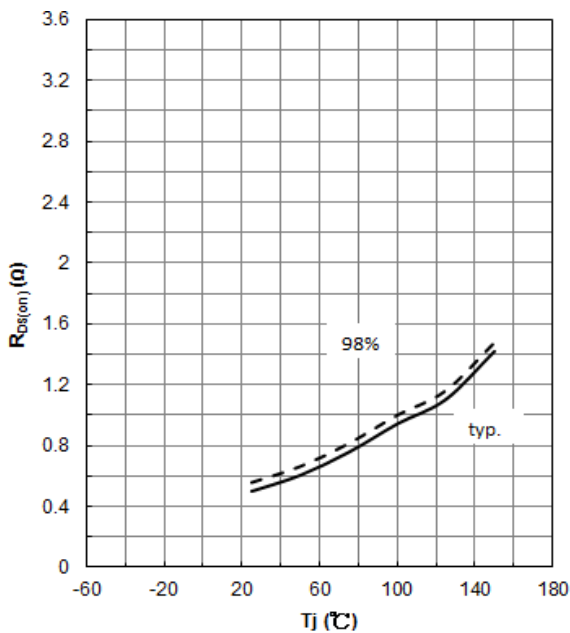


Fig 7: Drain-Source On-state Resistance

$R_{DS(on)} = f(T_j)$

parameter : $I_D = 4.6\text{A}, V_{GS} = 10\text{V}$

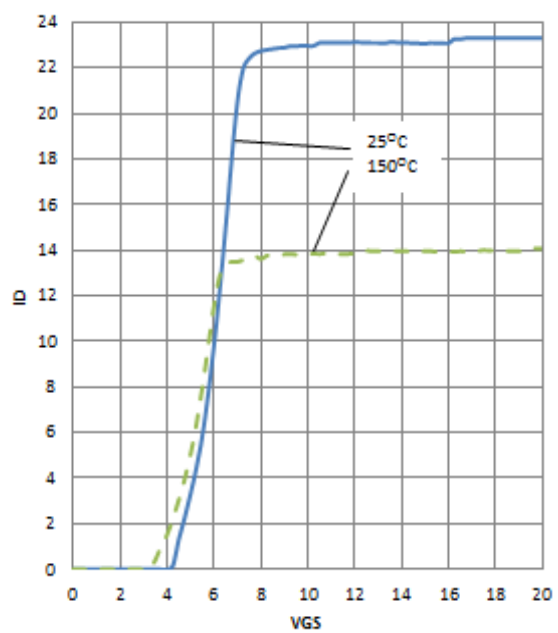


Fig 8: Typ. Transfer Characteristics

$I_D = f(V_{GS}) ; V_{DS} \geq 2 \times I_D \times R_{DS(on) \text{ max}}$

parameter : $t_p = 20 \mu\text{s}$



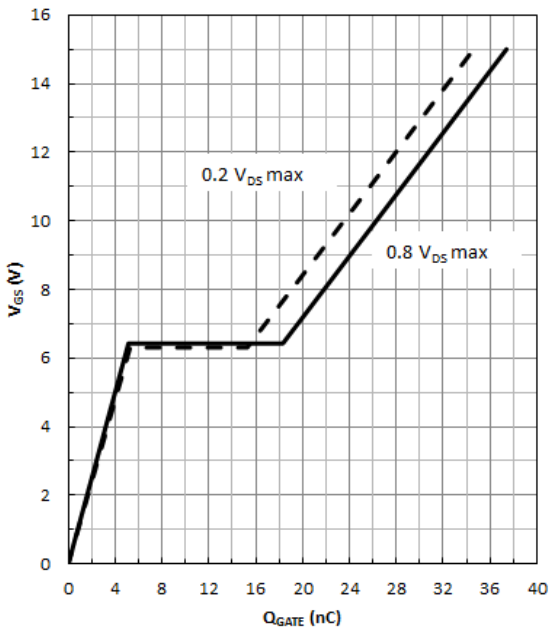


Fig 9: Typ. Gate Charge diode

$V_{GS} = f(Q_{GATE})$

parameter : I_D = 7.3A pulsed

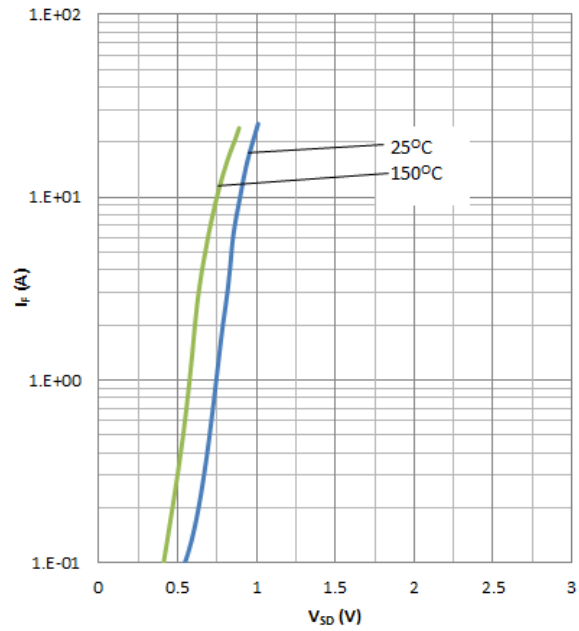


Fig 10: Forward characteristics of body

$I_F = f(V_{SD})$

parameter : T_j , t_p = 20us

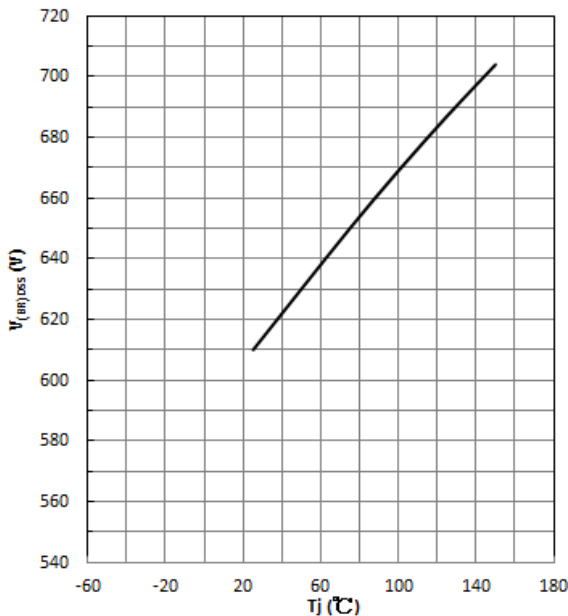


Fig 11: Drain-source breakdown voltage

$V_{(BR)DSS} = f(T_j)$

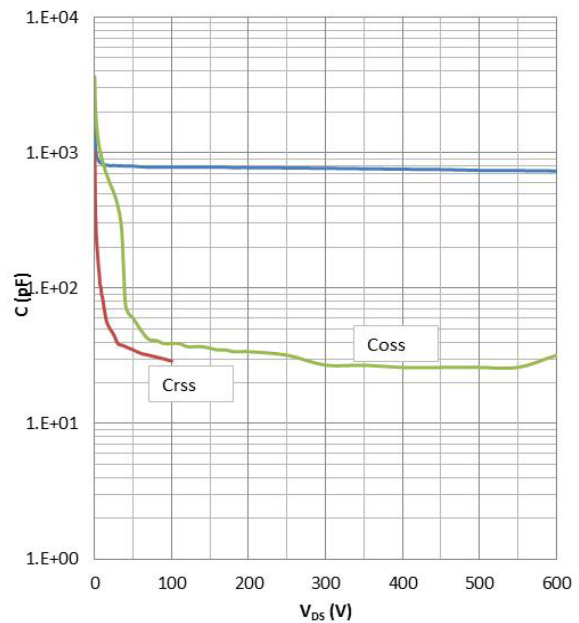


Fig 12: Typ. Capacitances

$C = f(V_{DS})$

parameter: V_{GS}=0V, f=1MHz



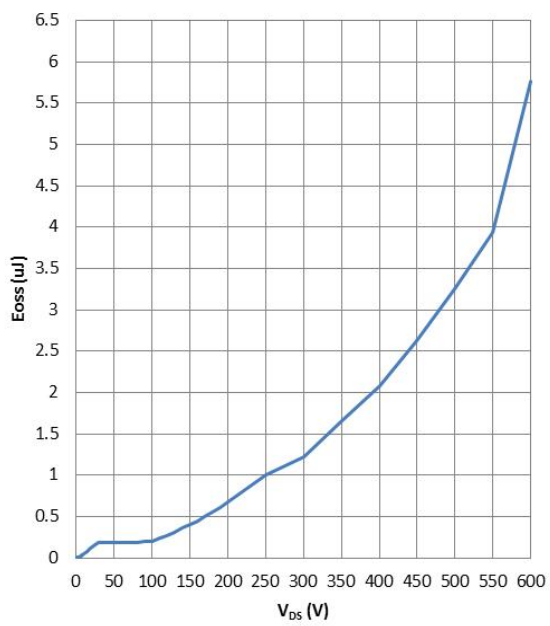


Fig 13: Typ. Coss stored energy

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



3. Test Circuits and Waveforms

Test Circuits and Waveforms

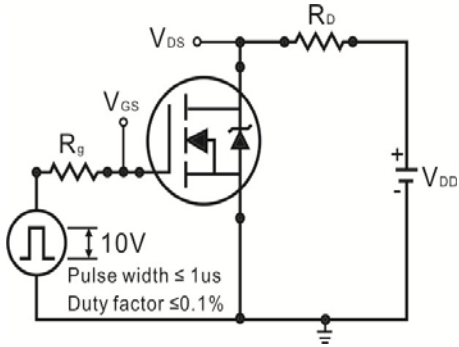


Figure 1: Switching times test circuit

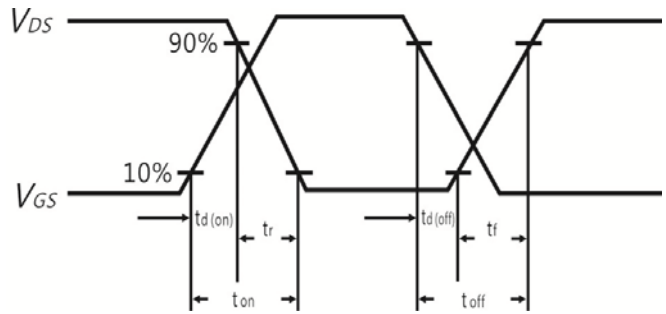


Figure 2: Switching time waveform

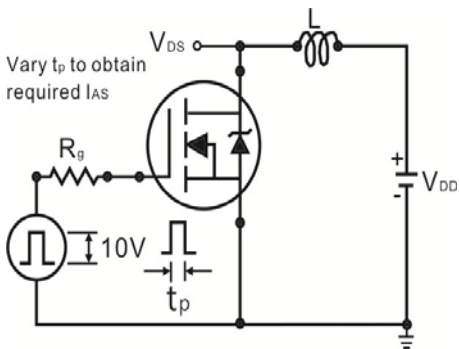


Figure 3: Unclamped test circuit

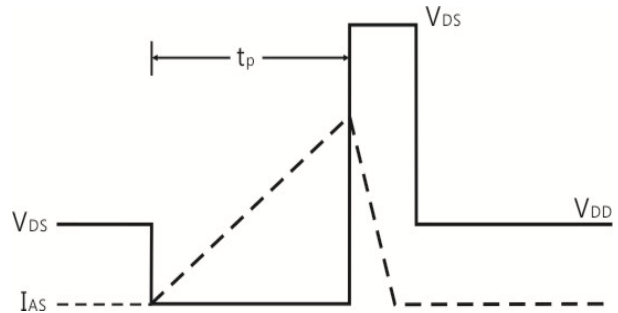


Figure 4: Unclamped test waveform

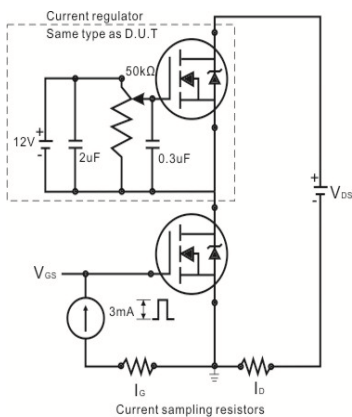


Figure 5: Gate charge test circuit

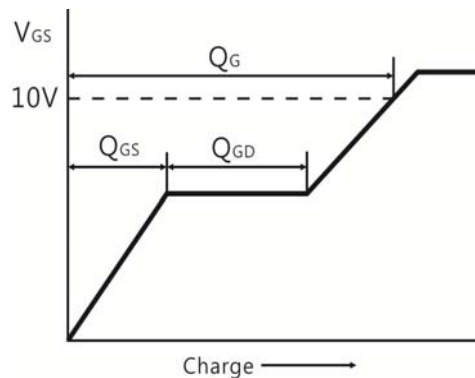
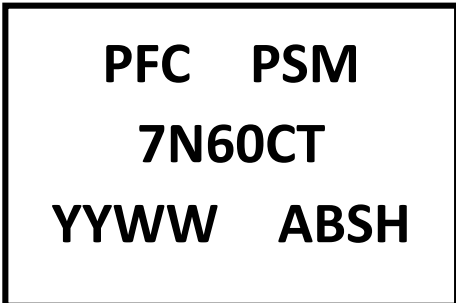


Figure 6: Basic gate charge waveform



4. Marking information

Top Marking Rule



PSM7N60CT = 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

TO-220AB

Dim.	Min.	Max.
A	-----	10.50
B	2.50	3.50
C	3.50	4.10
D	13.10	13.90
E	1.15	1.49
F	-----	6.35
G	0.65	0.95
H	2.29	2.79
I	4.80	5.30
J	4.40	4.80
K	1.14	1.40
L	5.84	6.86
M	8.50	9.60
N	2.03	2.92
O	0.30	0.64

All Dimensions in millimeter



6. Ordering information

Part Number	Package	Delivery mode
PSM7N60CT	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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