PSM11N60CT

PFC Device Corporation

11A 600V Single N-Channel Power MOSFET

Major ratings and characteristics

Characteristics	Values	Units
V_{DS}@T_J max	600	**V**
$R_{DS(ON)}$,V_{GS}=10V	0.34	**Ω**
I_D	11	**A**

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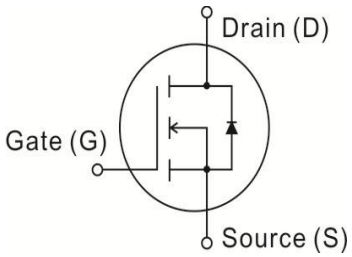
TO-220AB



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
- Lead Free Finish, RoHS Compliant

1. Characteristics

Maximum Ratings Characteristics (T_A = 25 °C unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-Source Voltage	600	V
I_D	Drain Current – Continuous (T_C=25°C)	11	A
	Drain Current – Continuous (T_C=100°C)	7	A
I_D pulsed	Pulsed Drain Current tp limited by T_J max (Note 1)	33	A
E_{AS}	Single Pulse Avalanche Energy (Noted 2)	340	mJ
E_{AR}	Avalanche Energy, repetitive t_{AR} limited by T_J max (Note 3) I_D=11A, V_{DD}=50V	0.6	mJ
I_{AR}	Avalanche Current, repetitive t_{AR} limited by T_J max	11	A
V_{GS}	Gate-Source Voltage Static	±20	V
V_{GS}	Gate-Source Voltage AC (f>1Hz)	±30	V
P_{tot}	Power Dissipation	125	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	63	°C/W
$R_{\theta JC}$	Thermal Resistance Junction to case (Drain)	---	1.0	°C/W

Electrical Characteristics (T_J = 25 °C unless otherwise specified)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	600	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=600V,V_{GS}=0V, T_J=25°C	---	0.1	1	uA
		V_{DS}=600V,V_{GS}=0V, T_J=150°C	---	---	100	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±30V , V_{DS}=0V	---	---	±100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V ,I_D=7A, T_J=25°C	---	0.29	0.34	Ω
		V_{GS}=10V ,I_D=7A, T_J=150°C	---	0.88	---	Ω
$V_{GS(th)}$	Gate-Source Threshold Voltage	V_{GS}=V_{DS} , I_D =500uA	2.1	3.0	3.9	V
R_G	Gate input resistance	f=1MHz, open Drain	---	0.7	---	Ω

Dynamic and switching Characteristics

Q_{gs}	Gate-Source Charge	V_{DD}=480V, I_D=11A, V_{GS}=0 to 10V	---	8	---	nC
Q_{gd}	Gate-Drain Charge		---	18	---	
Q_g	Gate charge total		---	40	60	
V (plateau)	Gate plateau voltage		---	6.0	---	V
gfs	Transconductance	V_{DS}≧2*I_D*$R_{DS(on)}$max, I_D=7A	---	11	---	S
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz	---	1240	---	pF
C_{oss}	Output Capacitance		---	790	---	
C_{rss}	Reverse Transfer Capacitance		---	67	---	

Drain-Source Diode Characteristics and Maximum Ratings

V_{SD}	Inverse diode forward voltage	I_S=11A, V_{GS}=0V	---	0.86	1.2	V
t_{rr}	Reverse Recovery Time	V_R=330V , I_F = 11A, di $_F$/ dt = 100A / uS	---	366	---	ns
Q_{rr}	Reverse Recovery Charge		---	6	---	uC
Irrm	Peak reverse recovery current		---	31	---	A

Note :
1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. V_{DD}=50V, I_D=5.5A, Starting T_J=25℃.
3. Repetitive avalanche cause additional power loss that can be calculated as P_{AV}=E_{AR}*f.

2. Characteristics Curves

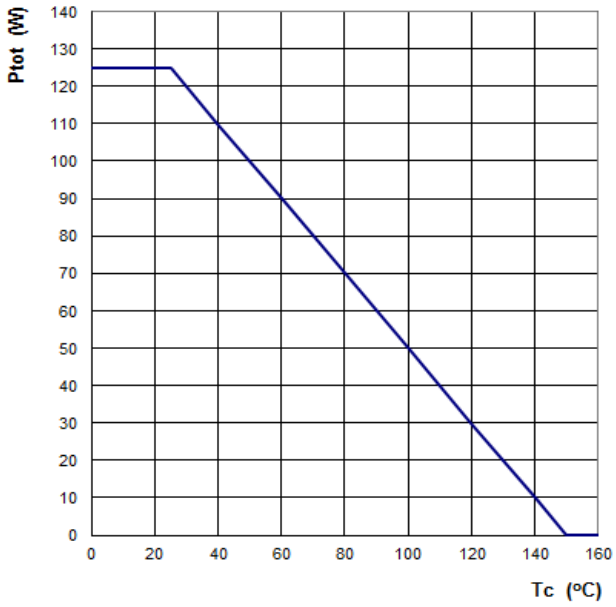


Fig 1: Power Dissipation

P_{tot} = f (T_C)

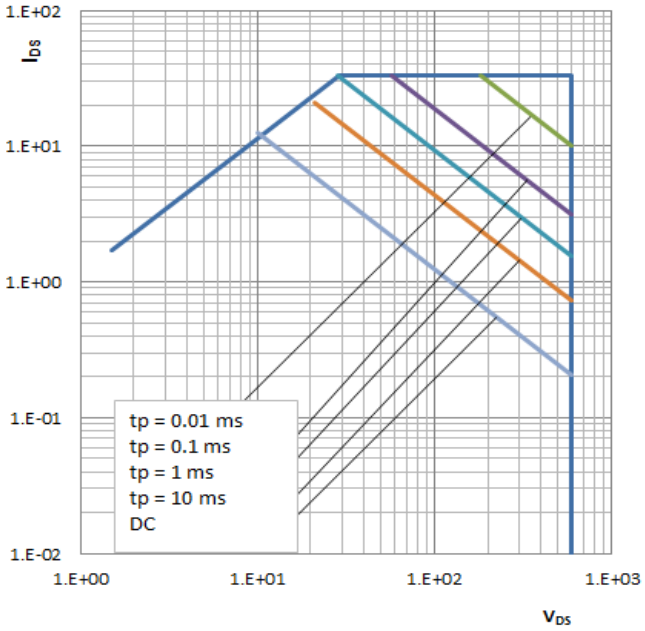


Fig 2: Safe operating area

I_D = f (V_{DS})

parameter : D = 0, T_C=25℃

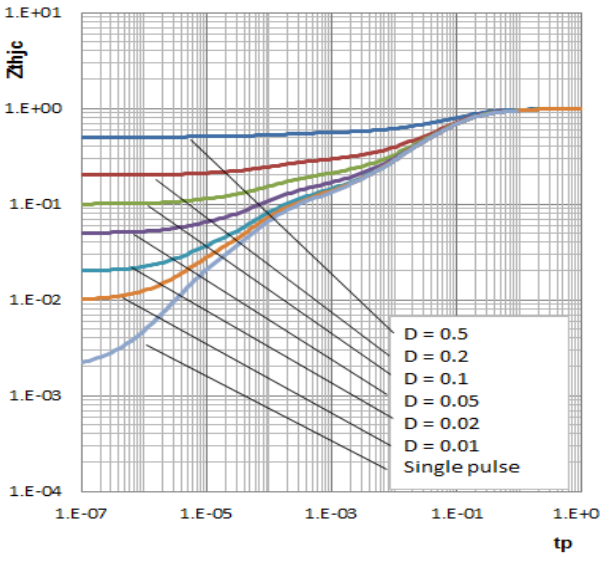


Fig 3: Transient thermal impedance

Z_{thJC} = f(tp)

parameter : D = tp / T

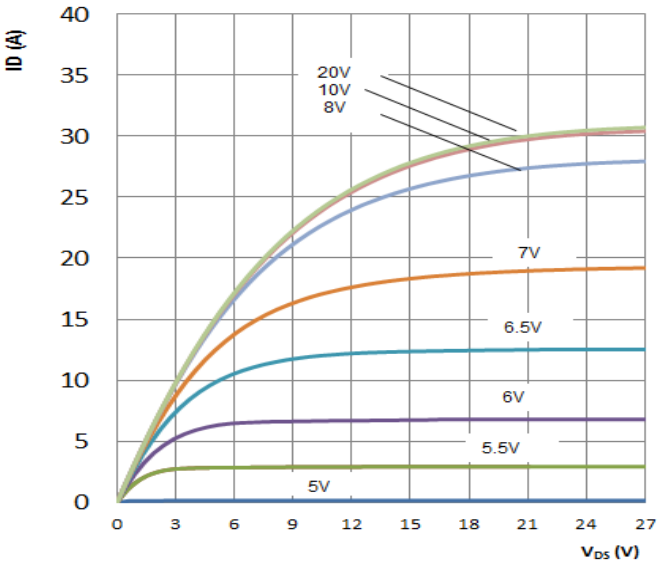


Fig 4: Typ. Output Characteristics

I_D = f (V_{DS}) ; Tj = 25℃

parameter : tp = 100uS, V_{GS}

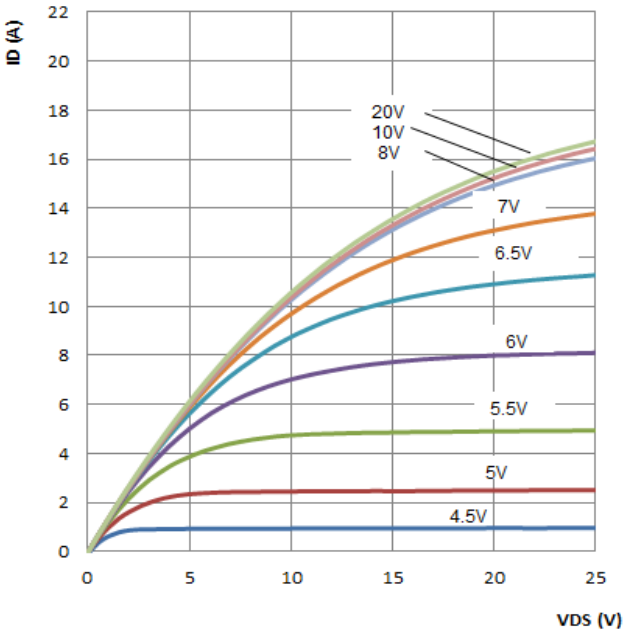


Fig 5: Typ. Output Characteristics

I_D = f (V_{DS}) ; Tj = 150℃

parameter : tp = 100uS, V_{GS}

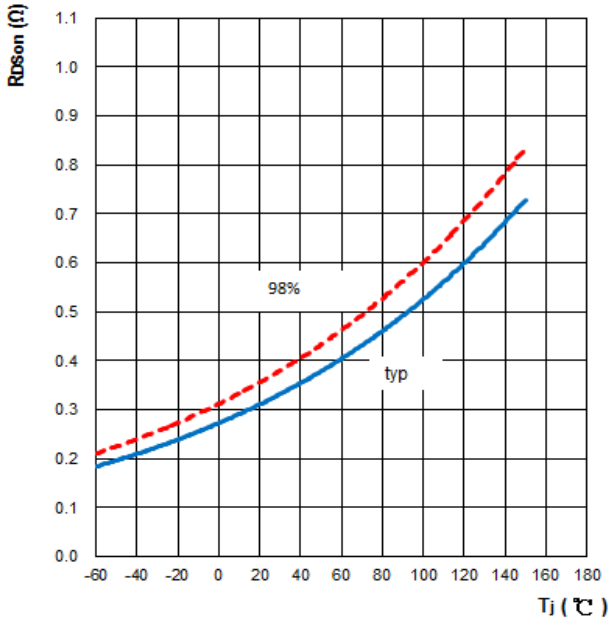


Fig 6: Drain-Source On-state Resistance

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

parameter : I_D =7A, V_{GS} = 10V

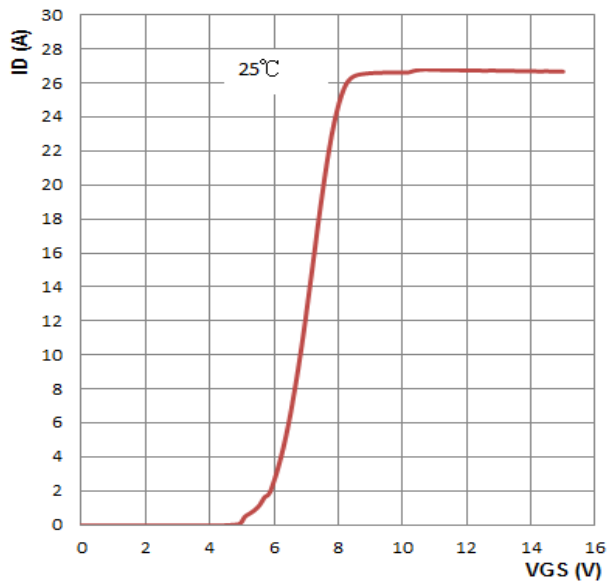


Fig 7: Typ. Transfer Characteristics

I_D = f (VGS); VDS ≧2 X ID X RDS(on) max

parameter : tp = 100 uS

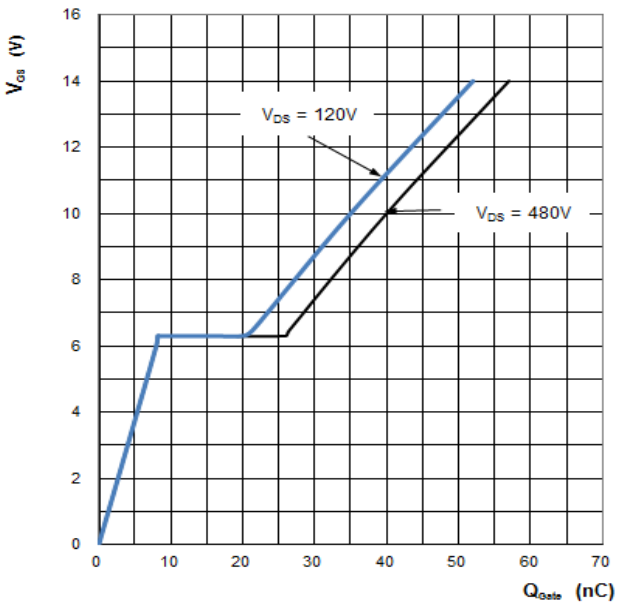


Fig 8: Typ. Gate Charge

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

parameter : I_D = 11A pulsed

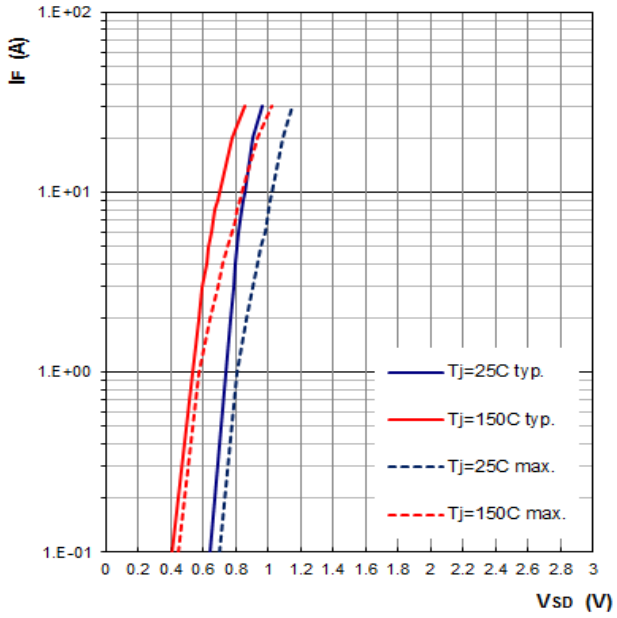


Fig 9: Forward characteristics of body diode

$I_F = f(V_{SD})$

parameter : Tj , tp =100us

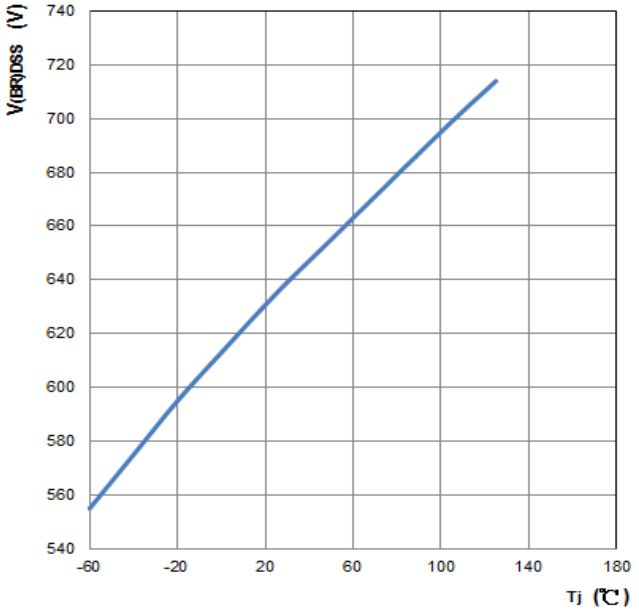


Fig 10: Drain-source breakdown voltage

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

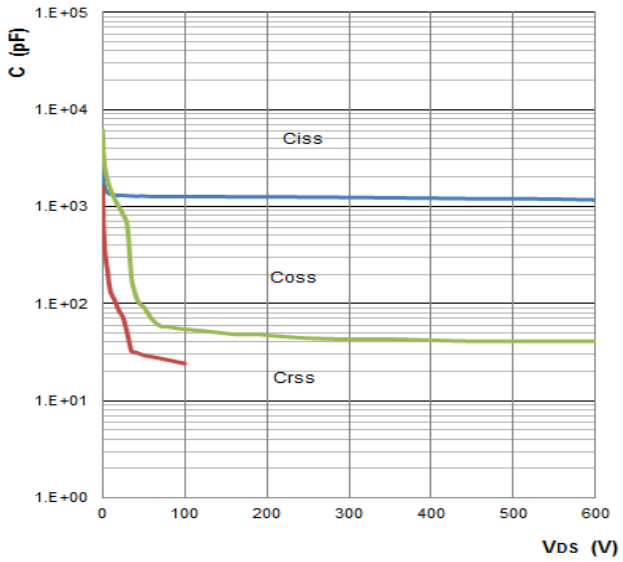


Fig 11: Typ. Capacitances

$C = f(V_{DS})$

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

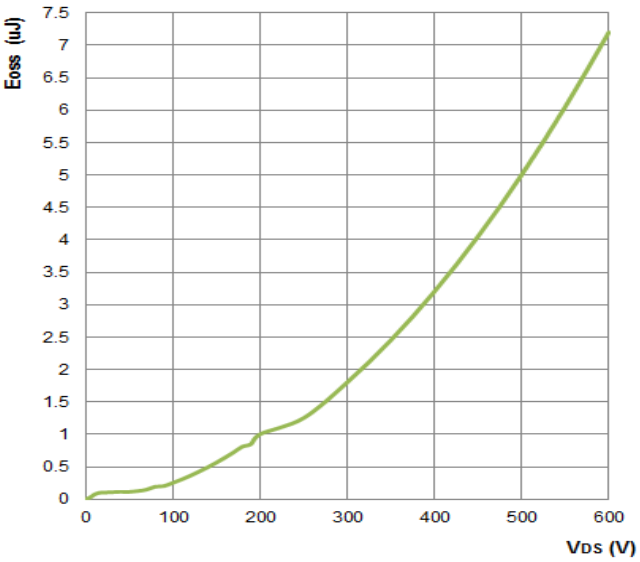


Fig 12: Typ. C_{oss} stored energy

3. Test Circuits and Waveforms

Test Circuits and Waveforms

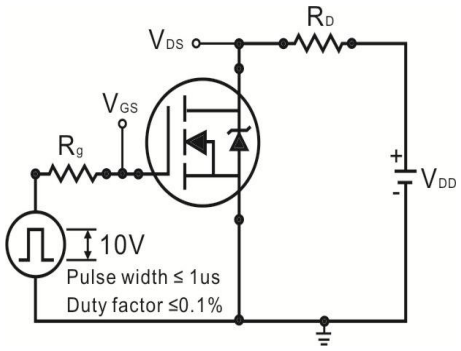


Figure 1: Switching times test circuit

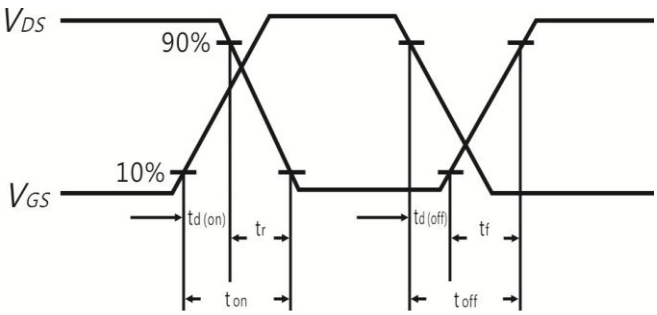


Figure 2: Switching time waveform

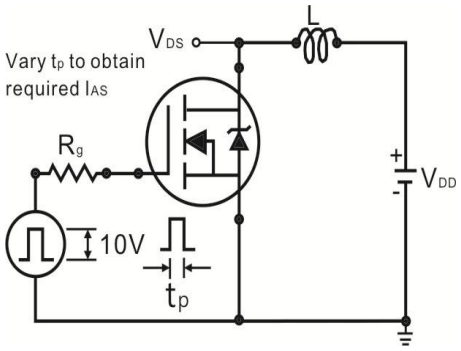


Figure 3:Unclamped test circuit

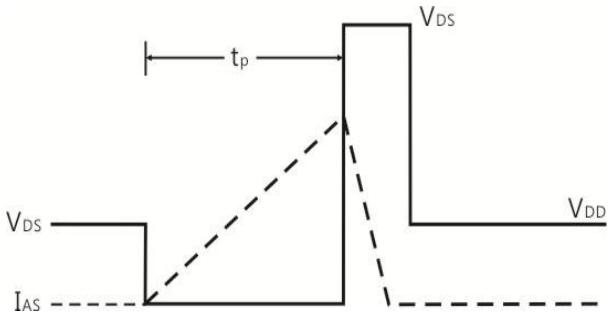


Figure 4: Unclamped test waveform

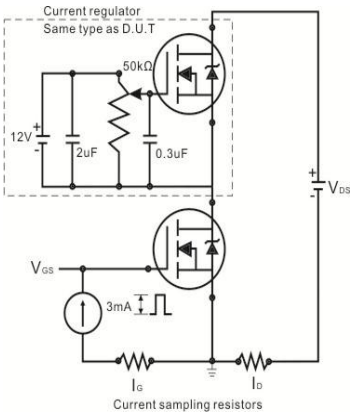


Figure 5:Gate charge test circuit

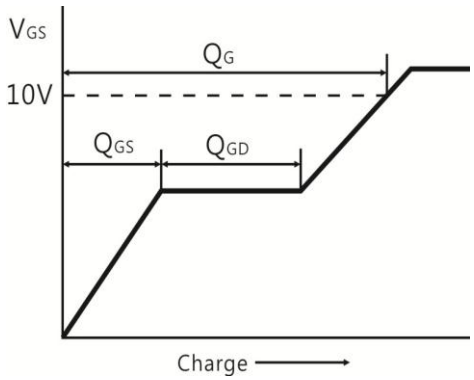


Figure 6: Basic gate charge waveform

4. Marking information

Top Marking Rule

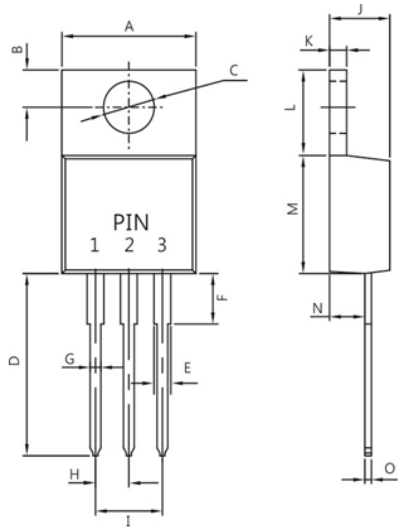
PFC PSM
11N60CT
YYWW ABSH

PSM11N60CT = Product Type Marking Code
YY = Last two digits of year
WW = Week code
AB = Assembly code
S = Series number(0~9, A~Z, a~z) for lot number control
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
PSM11N60CT	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