



PFC Device Corporation

PSM11N60CT

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

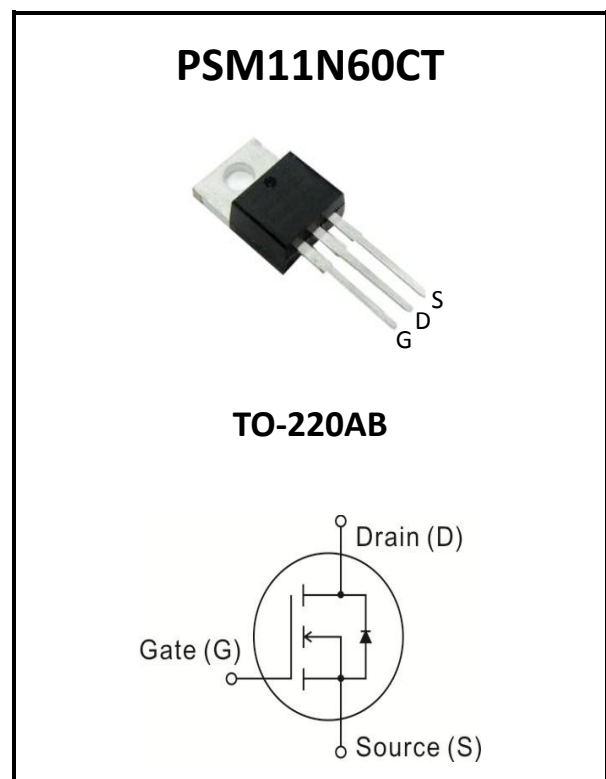
General Description

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

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

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-Source Voltage	600	V
I_D	Drain Current – Continuous ($T_C=25^\circ\text{C}$)	11	A
	Drain Current – Continuous ($T_C=100^\circ\text{C}$)	7	A
$I_{D\text{ pulsed}}$	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)	0.6	mJ
	$I_D=11\text{A}$, $V_{DD}=50\text{V}$		
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 ($f>1\text{Hz}$)	± 30	V
P_{tot}	Power Dissipation	125	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

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



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	$V_{DS}=600V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	0.1	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	$V_{GS}=10V, I_D=7A, T_J=25^\circ\text{C}$	---	0.29	0.34	Ω
		$V_{GS}=10V, I_D=7A, T_J=150^\circ\text{C}$	---	0.88	---	Ω
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=500\mu A$	2.1	3.0	3.9	V
R_G	Gate input resistance	$f=1\text{MHz}$, 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	
$V(\text{plateau})$	Gate plateau voltage		---	6.0	---	V
g_{fs}	Transconductance	$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}, I_D=7A$	---	11	---	S
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$	---	1240	---	pF
C_{oss}	Output Capacitance		---	790	---	
C_{riss}	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	$V_R=330V, I_F=11A,$ $di_F/dt = 100A/\mu S$	---	366	---	ns
Q_{rr}	Reverse Recovery Charge		---	6	---	μC
I_{rrm}	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 $T_J=25^\circ\text{C}$.
3. Repetitive avalanche cause additional power loss that can be calculated as $P_{AV}=E_{AR} \cdot f$.



2. Characteristics Curves

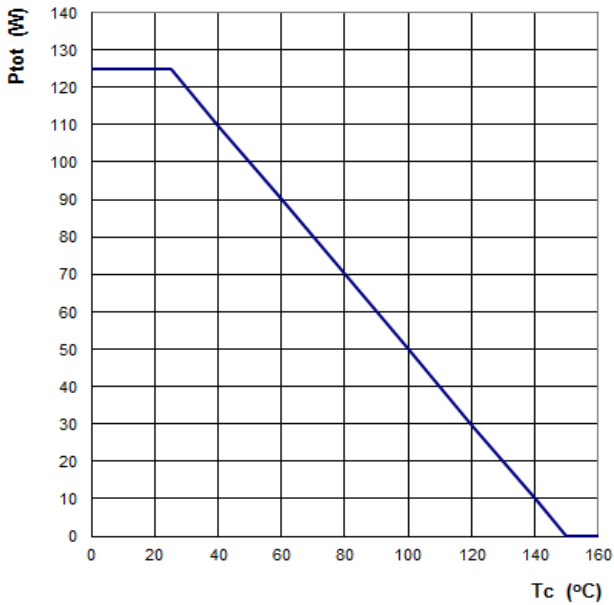


Fig 1: Power Dissipation

$P_{tot} = f(T_c)$

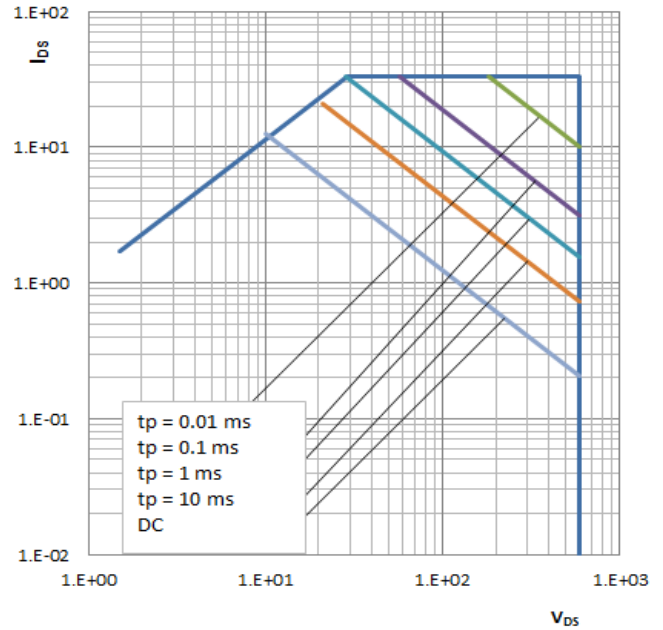


Fig 2: Safe operating area

$I_D = f(V_{DS})$

parameter : D = 0, T_C=25°C

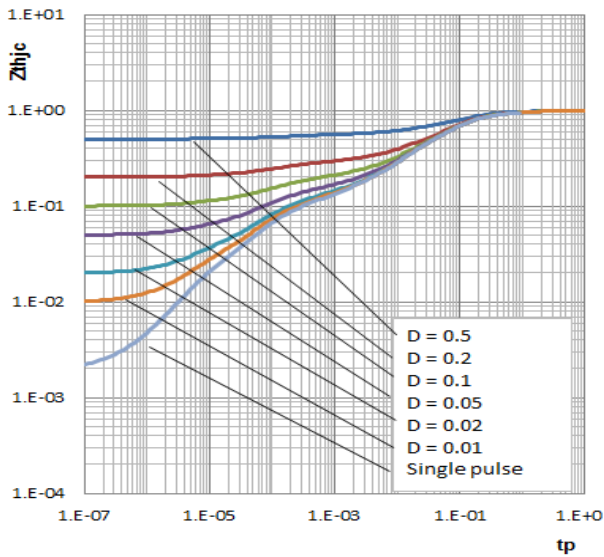


Fig 3: Transient thermal impedance

$Z_{thjc} = f(tp)$

parameter : D = tp / T

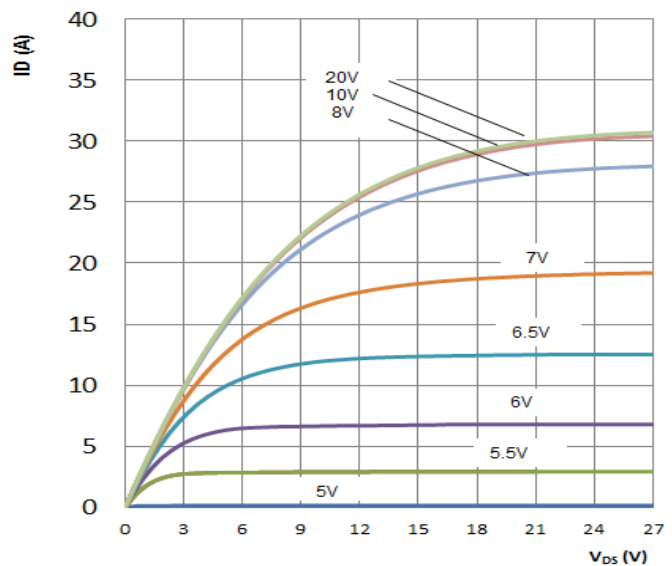


Fig 4: Typ. Output Characteristics

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

parameter : tp = 100uS, V_{GS}



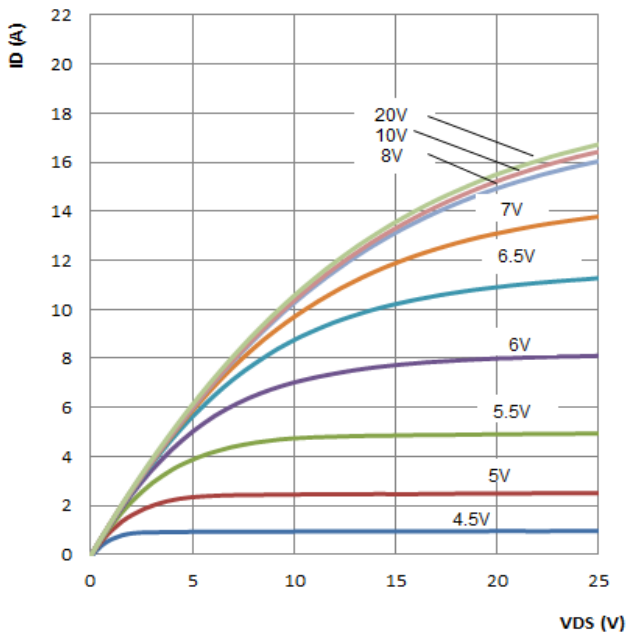


Fig 5: Typ. Output Characteristics

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

parameter : $t_p = 100\mu\text{s}$, V_{GS}

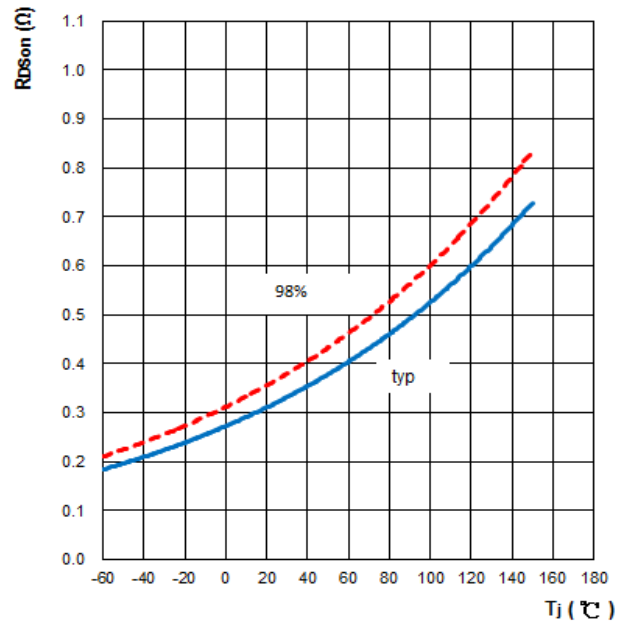


Fig 6: Drain-Source On-state Resistance

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

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

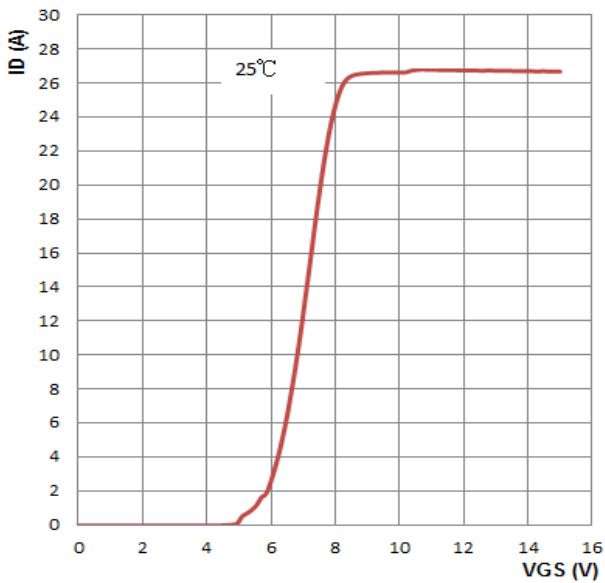


Fig 7: Typ. Transfer Characteristics

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

parameter : $t_p = 100\mu\text{s}$

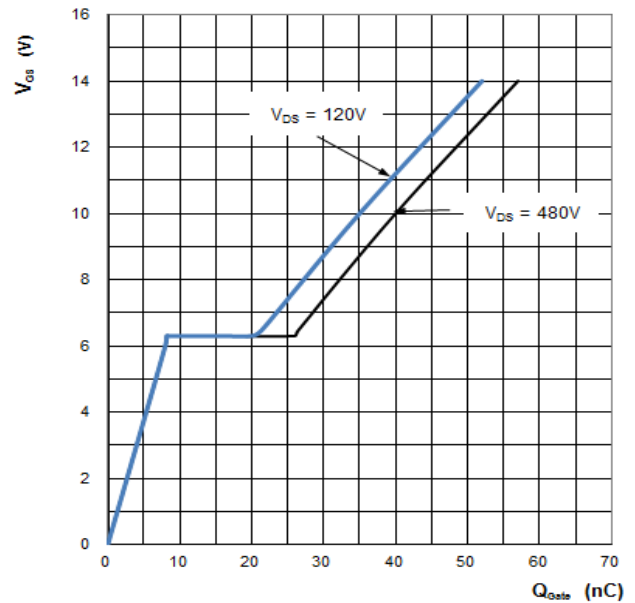


Fig 8: Typ. Gate Charge

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

parameter : $I_D = 11\text{A}$ pulsed



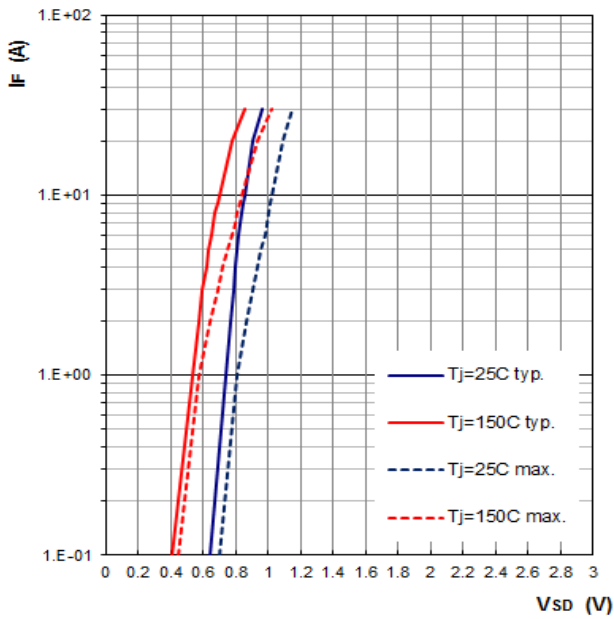


Fig 9: Forward characteristics of body diode

$I_F = f(V_{SD})$

parameter : T_J , $t_p = 100\mu s$

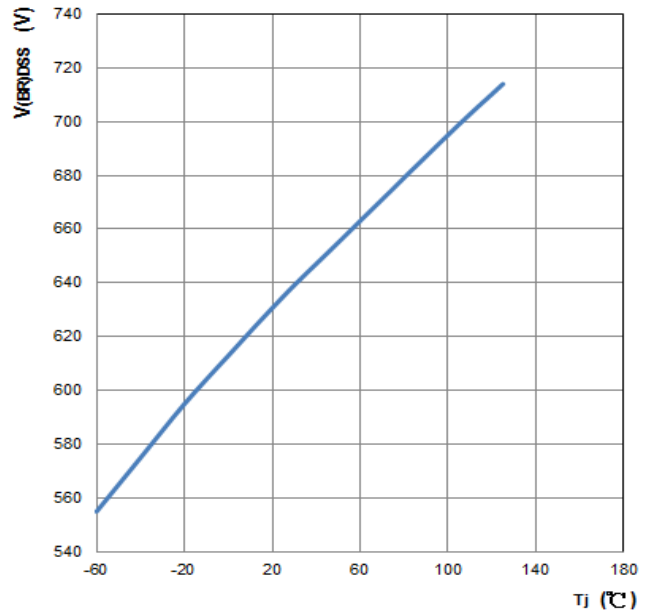


Fig 10: Drain-source breakdown voltage

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

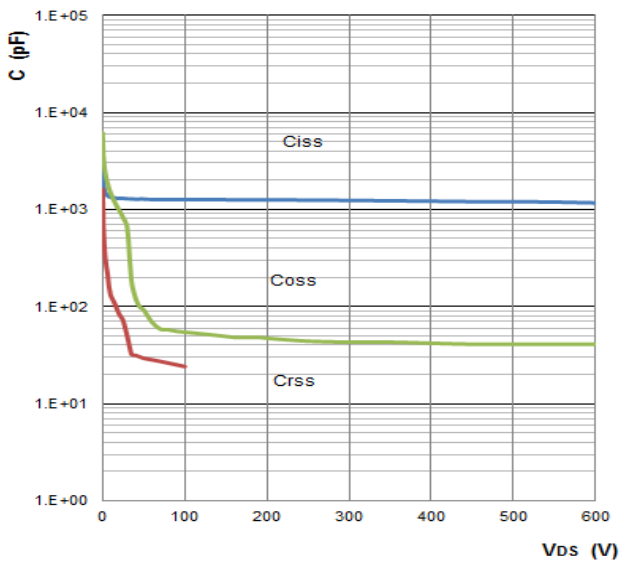


Fig 11: Typ. Capacitances

$C = f(V_{DS})$

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

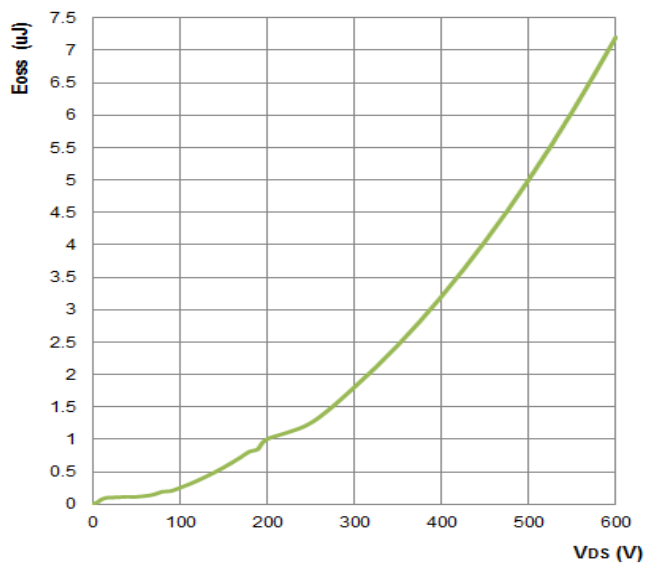


Fig 12: Typ. C_{OSS} stored energy



3. Test Circuits and Waveforms

Test Circuits and Waveforms

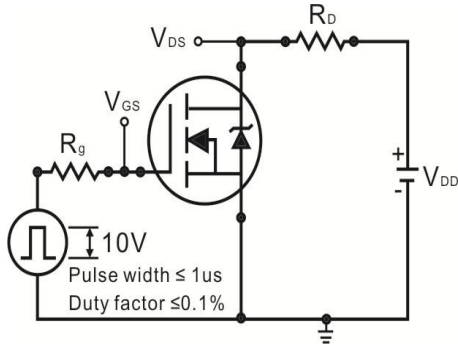


Figure 1: Switching times test circuit

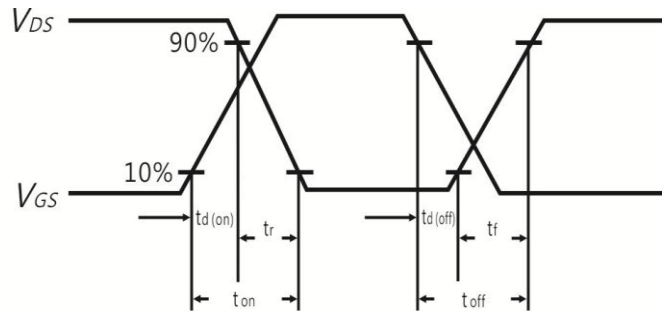


Figure 2: Switching time waveform

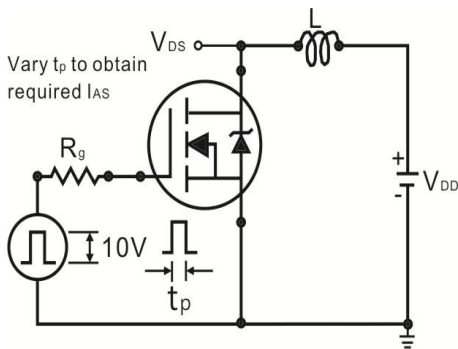


Figure 3: Unclamped test circuit

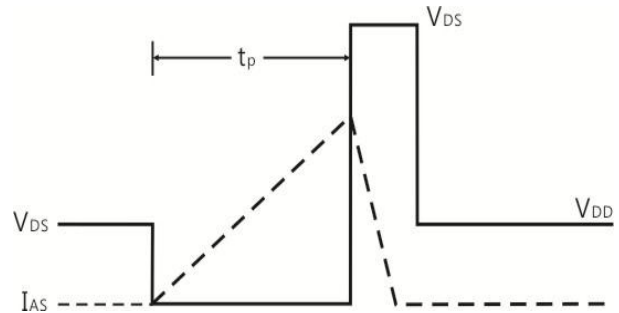


Figure 4: Unclamped test waveform

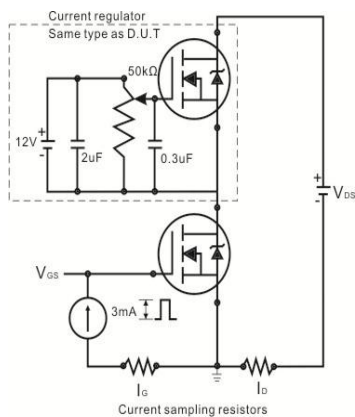


Figure 5: Gate charge test circuit

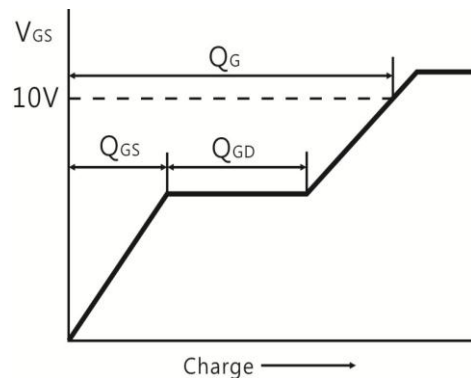
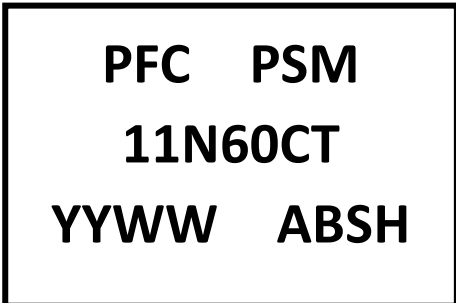


Figure 6: Basic gate charge waveform



4. Marking information

Top Marking Rule



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

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