



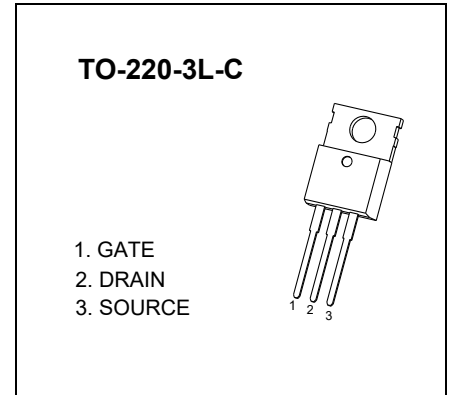
## TO-220-3L-C Plastic-Encapsulate MOSFETS

### P120SN10 N-Channel Power MOSFET

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D$
100V	4.6mΩ@10V	120A

#### DESCRIPTION

The P120S10 uses shielded gate trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications



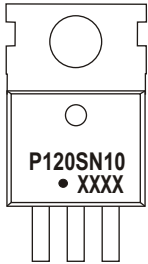
#### FEATURES

- Low  $R_{DS(on)}$
- Low Gate Charge

#### APPLICATIONS

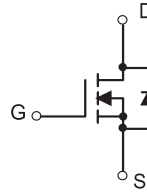
- High efficiency power supply
- Secondary synchronous rectifier

#### MARKING



P120SN10 = Device code.  
Solid dot = Green molding compound device if none, the normal device.  
XXXX = Code.

#### EQUIVALENT CIRCUIT



#### MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ unless otherwise noted )

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current	$I_D^{①}$	120	A
Pulsed Drain Current	$I_{DM}^{②}$	480	A
Single Pulsed Avalanche Energy	$E_{AS}^{③}$	200	mJ
Power Dissipation	$P_D^{①}$	185	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance from Junction to Case	$R_{\theta JC}^{①}$	0.67	°C/W
Operation Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 ~ +150	°C

# MOSFET ELECTRICAL CHARACTERISTICS

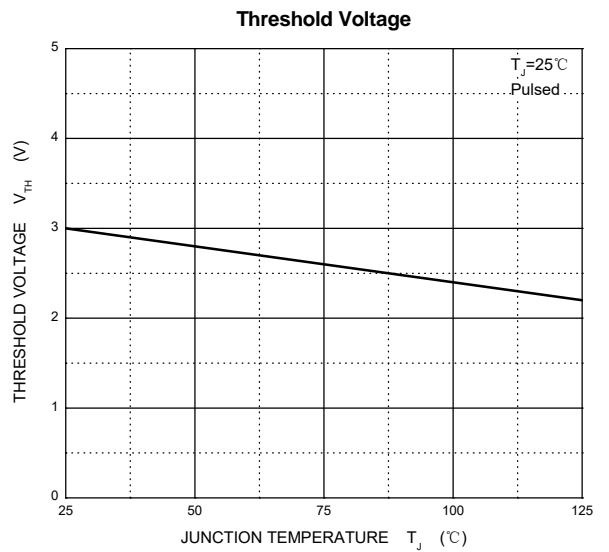
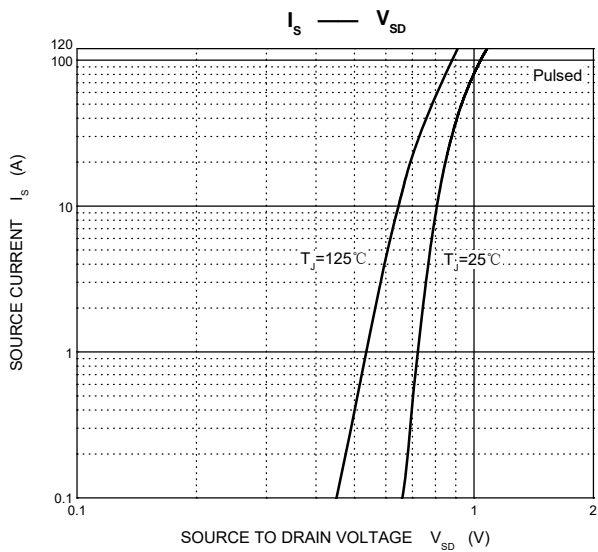
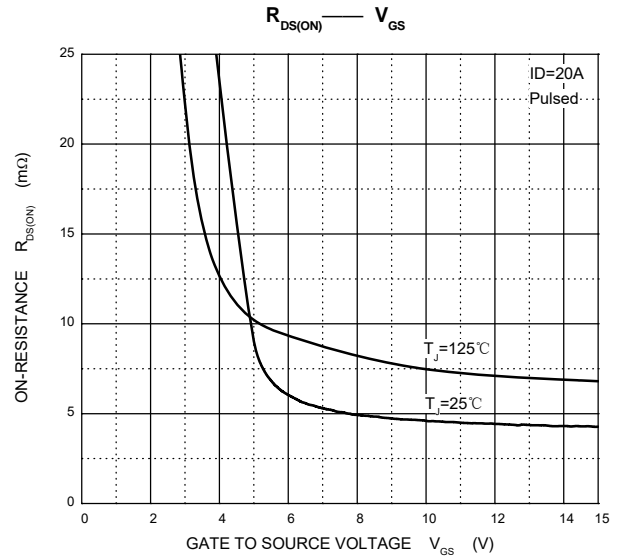
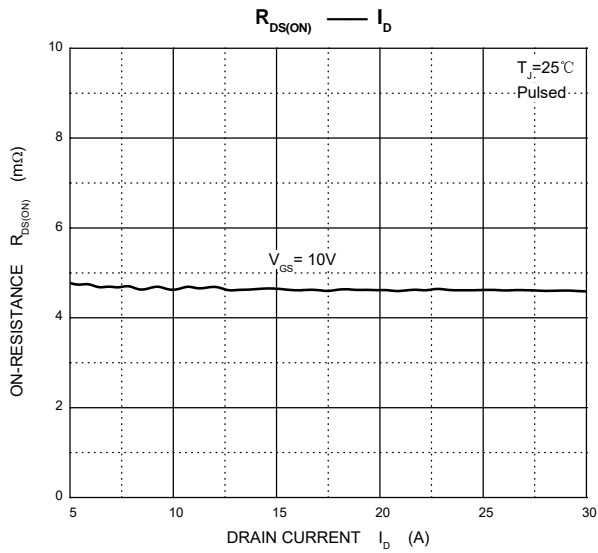
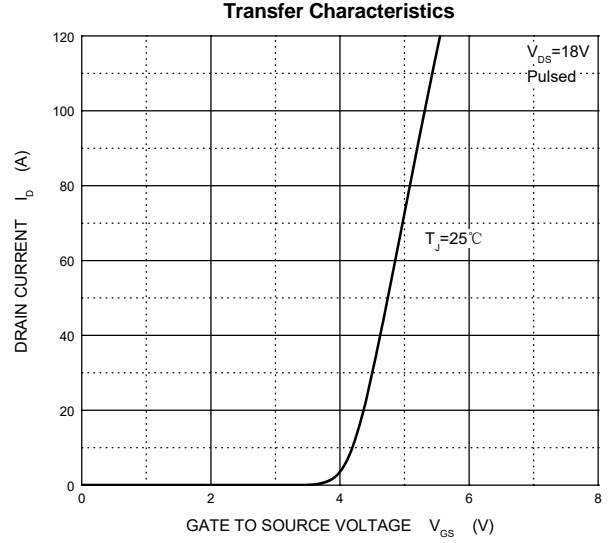
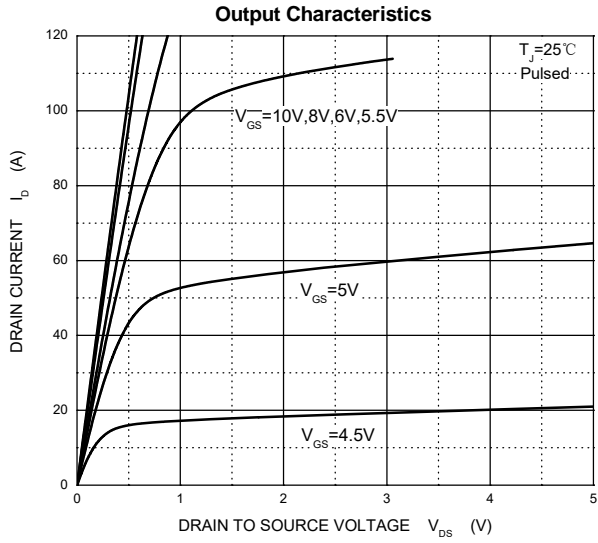
$T_a=25^\circ\text{C}$  unless otherwise specified

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Off characteristics</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	100			V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 100V, V_{GS} = 0V$	$T_J = 25^\circ\text{C}$		1.0	$\mu A$
			$T_J = 125^\circ\text{C}$		100	
Gate-body leakage current	$I_{GSS}$	$V_{DS} = 0V, V_{GS} = \pm 20V$			$\pm 100$	nA
<b>On characteristics</b> ④						
Gate-threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	3.0	4.0	V
Static drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$		4.6	5.5	m $\Omega$
<b>Dynamic characteristics</b> ④ ⑤						
Input capacitance	$C_{iss}$	$V_{DS} = 25V, V_{GS} = 0V, f = 1\text{MHz}$		4190	8380	pF
Output capacitance	$C_{oss}$			1777	3500	
Reverse transfer capacitance	$C_{rss}$			34	69	
Gate resistance	$R_g$	$f = 1\text{MHz}$		1.8		$\Omega$
<b>Switching characteristics</b> ④ ⑤						
Total gate charge	$Q_g$	$V_{GS} = 10V, V_{DS} = 80V, I_D = 10A$		68	140	nC
Gate-source charge	$Q_{gs}$			15	30	
Gate-drain charge	$Q_{gd}$			20	42	
Turn-on delay time	$t_{d(on)}$	$V_{DS}=80V, I_D=20A, V_{GS}=10V, R_G=3.3\Omega$		13		ns
Turn-on rise time	$t_r$			60		
Turn-off delay time	$t_{d(off)}$			40		
Turn-off fall time	$t_f$			64		
<b>Drain-Source Diode Characteristics</b>						
Drain-source diode forward voltage(note1)	$V_{SD}$ ④	$V_{GS} = 0V, I_S = 20A$			1.2	V
Continuous drain-source diode forward current	$I_S$ ①				120	A
Pulsed drain-source diode forward current	$I_{SM}$ ②				480	A

Notes:

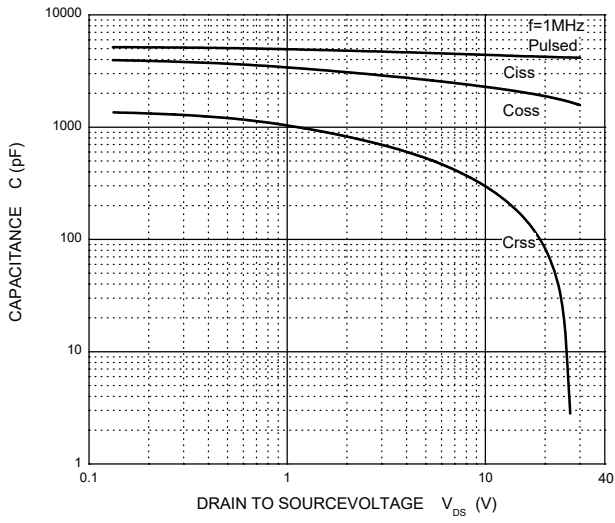
- $T_C=25^\circ\text{C}$  Limited only by maximum temperature allowed.
- $P_w \leq 10\mu s$ , Duty cycle  $\leq 1\%$ .
- EAS condition:  $V_{DD}=50V, V_{GS}=10V, L=0.5\text{mH}, R_g=25\Omega$  Starting  $T_J = 25^\circ\text{C}$ .
- Pulse Test : Pulse Width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production.

# Typical Characteristics

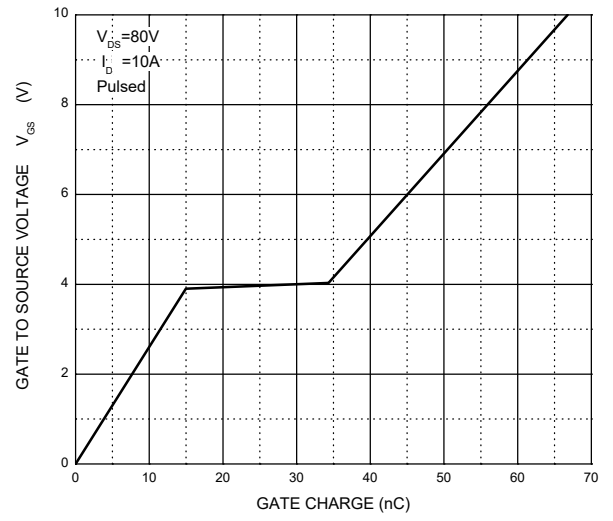


# Typical Characteristics

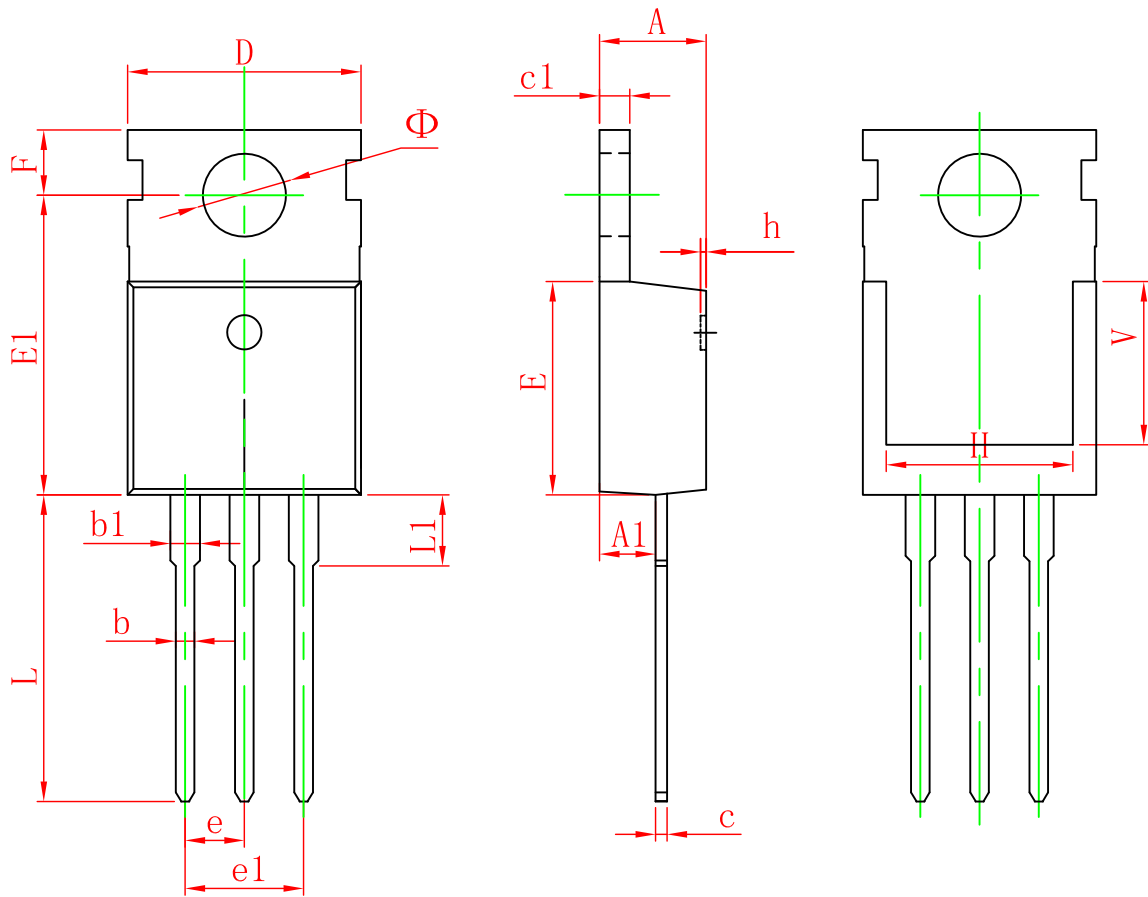
### Capacitances



### Gate Charge



# TO-220-3L-C Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
$\Phi$	3.400	3.800	0.134	0.150