

General Description:

The JS3N120A9FR uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge. It can be used in a wide variety of applications. The package form is TO-220F, which accords with the RoHS standard.

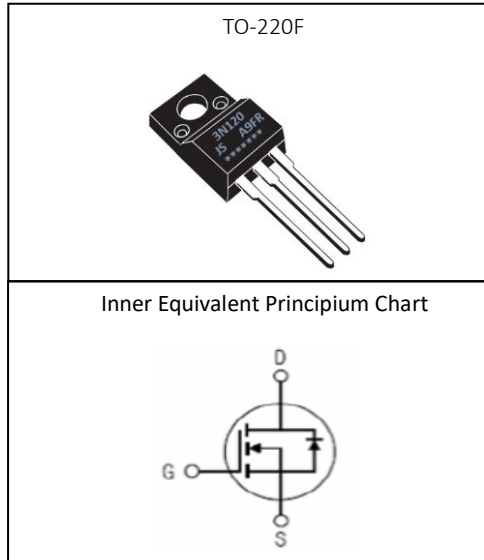
Features:

- Fast Switching
- Low Gate Charge and Rdson
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

Applications:

- Power switching application
- Hard switched and high frequency circuits
- Electric welder、 Inverter

V _{DSS}	1200	V
I _D	3	A
P _D (T _C =25°C)	30	W
R _{DS(ON) TYPE}	5.1	Ω


Package Marking and Ordering Information:

Device Marking	Device	Device Package	Quantity
JS3N120A9FR	JS3N120A9FR	TO-220F	50 units

Absolute Maximum Ratings (TA= 25°C unless otherwise specified):

Symbol	Parameter	Rating	Units
V _{DSS}	Drain-to-Source Voltage	1200	V
I _D	Continuous Drain Current	3.0	A
	Continuous Drain Current T _C = 100 °C	1.8	A
I _{DM} ^{a1}	Pulsed Drain Current	12	A
V _{GS}	Gate-to-Source Voltage	±30	V
E _{AS} ^{a2}	Single Pulse Avalanche Energy	30	mJ
dv/dt ^{a3}	Peak Diode Recovery dv/dt	5.0	V/ns
P _D	Power Dissipation	30	W
T _J , T _{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	°C
T _L	Maximum Temperature for Soldering	300	°C

Electrical Characteristics (T_c= 25°C unless otherwise specified):

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V _{DSS}	Drain to Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	1200	--	--	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	I _D =250μA, Reference 25°C	--	1.24	--	V/°C
I _{DSS}	Drain to Source Leakage Current	V _{DS} = 1200V, V _{GS} = 0V, T _a = 25°C	--	--	25	μA
		V _{DS} = 960V, V _{GS} = 0V, T _a = 125°C	--	--	250	
I _{GSS(F)}	Gate to Source Forward Leakage	V _{GS} = +30V	--	--	100	nA
I _{GSS(R)}	Gate to Source Reverse Leakage	V _{GS} = -30V	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
R _{DS(ON)}	Drain-to-Source On-Resistance	V _{GS} =10V, I _D =1.5A	--	5.1	6.0	Ω
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	3.0	4.0	5.0	V
Pulse width tp ≤ 300μs, δ ≤ 2%						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g _{fs}	Forward Transconductance	V _{DS} =15V, I _D = 1.5A	--	5	--	S
R _g	Gate resistance	f = 1.0MHz	--	2.2	--	Ω
C _{iss}	Input Capacitance	V _{GS} = 0V	--	1006	--	pF
C _{oss}	Output Capacitance	V _{DS} = 25V	--	59.8	--	
C _{rss}	Reverse Transfer Capacitance	f = 1.0MHz	--	2.2	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D = 3.0A	--	15.1	--	ns
t _r	Rise Time	V _{DS} = 600V	--	19.4	--	
t _{d(OFF)}	Turn-Off Delay Time	V _{GS} = 10V	--	25.6	--	
t _f	Fall Time	R _G = 10Ω	--	76.2	--	
Q _g	Total Gate Charge	I _D = 3A	--	19.7	--	nC
Q _{gs}	Gate to Source Charge	V _{DD} = 960V	--	7.5	--	
Q _{gd}	Gate to Drain ("Miller") Charge	V _{GS} = 10V	--	5.4	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	3	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	12	A
V_{SD}	Diode Forward Voltage	$I_S=3.0A, V_{GS}=0V$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S=3.0A, T_j = 25^\circ$ $di_F/dt=100A/us,$	--	526	--	ns
Q_{rr}	Reverse Recovery Charge	$V_{GS}=0V$	--	2	--	μC
Pulse width $t_p \leq 300\mu s, \delta \leq 2\%$						

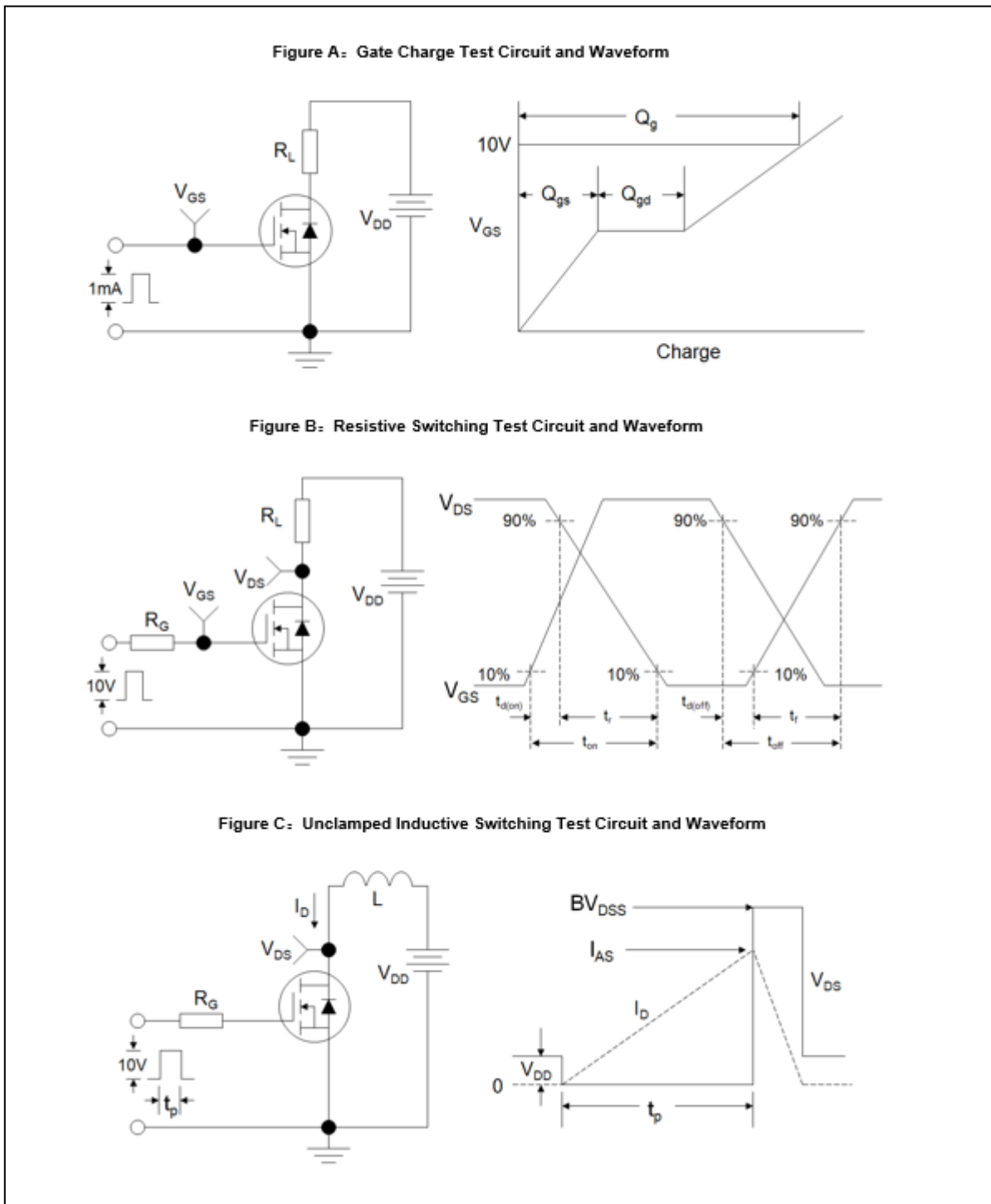
Thermal Characteristics

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case	4.2	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient	62.5	$^\circ C/W$

a¹: Repetitive rating; pulse width limited by maximum junction temperature

a²: $L=10.0mH, I_D=2.5A, Start T_j=25^\circ C$

a³: $I_{SD} = 3.0A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}, Start T_j=25^\circ C$

Test Circuit and Waveform


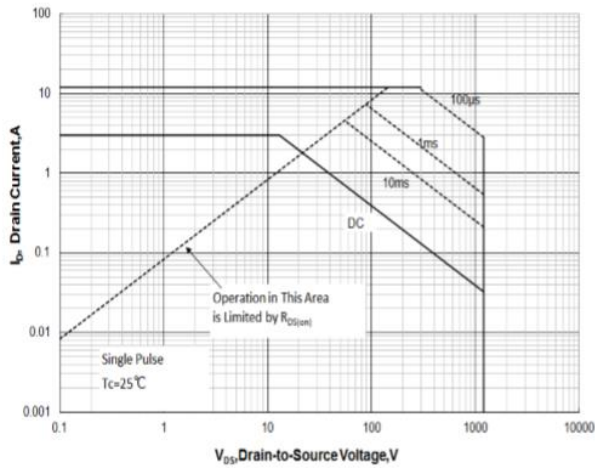
Typical Performance Characteristics


Figure 1 Maximum Forward Bias Safe Operating Area

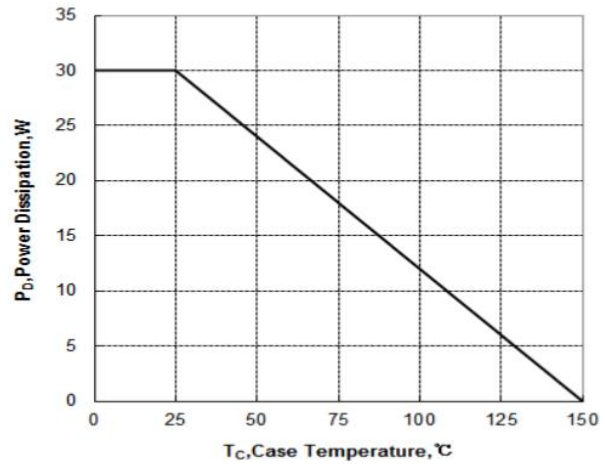


Figure 2 Maximum Power dissipation vs Case Temperature

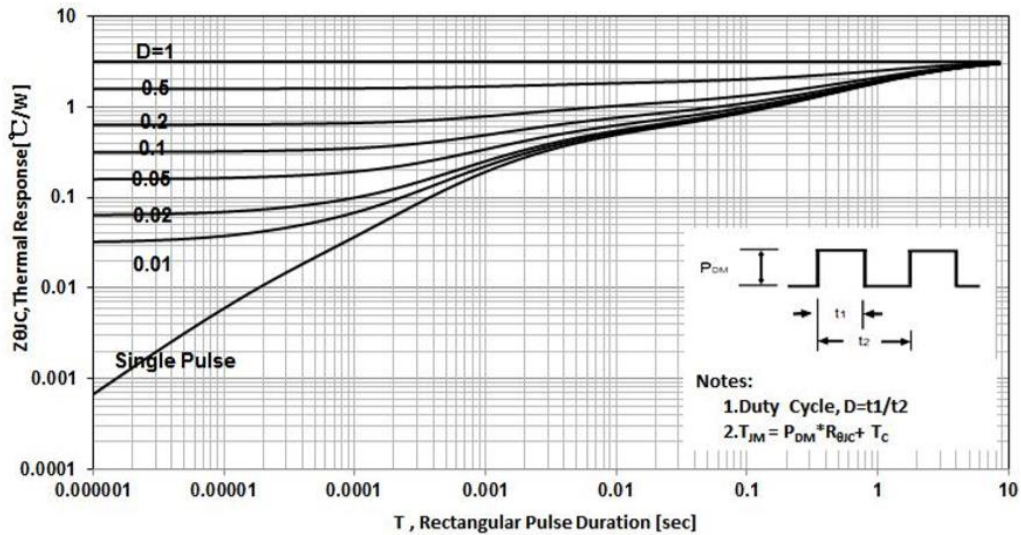
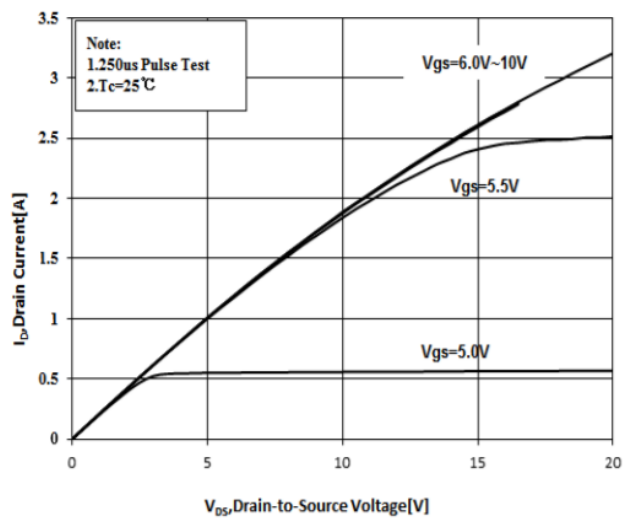
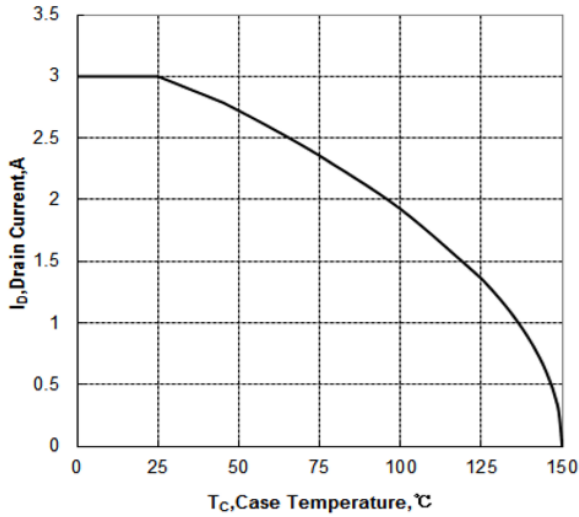


Figure 5 Maximum Effective Thermal Impedance , Junction to Case

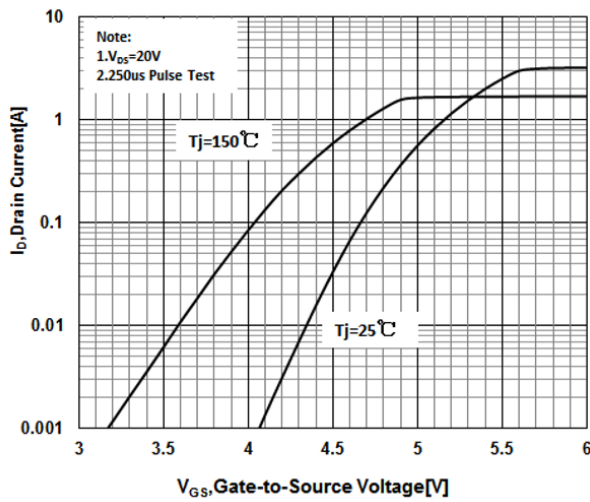


Figure 6 Typical Transfer Characteristics

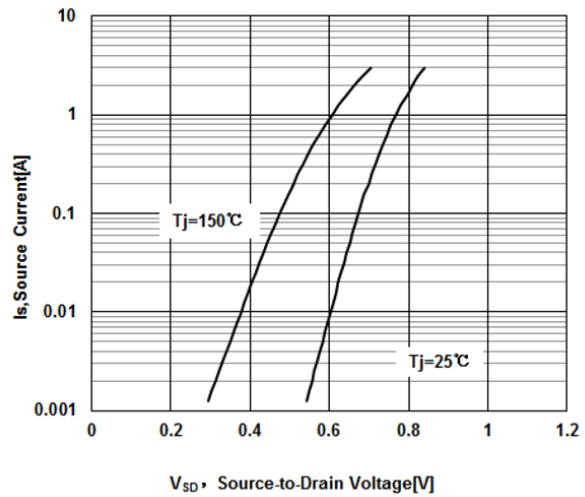


Figure 7 Typical Body Diode Transfer Characteristics

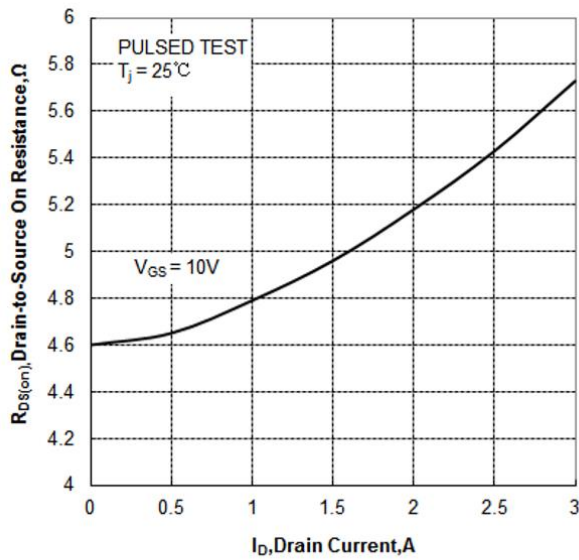


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

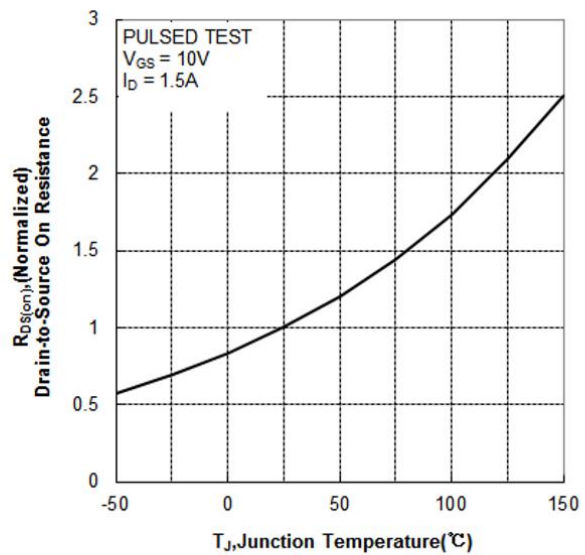


Figure 9 Typical Drain to Source on Resistance vs Junction Temperature

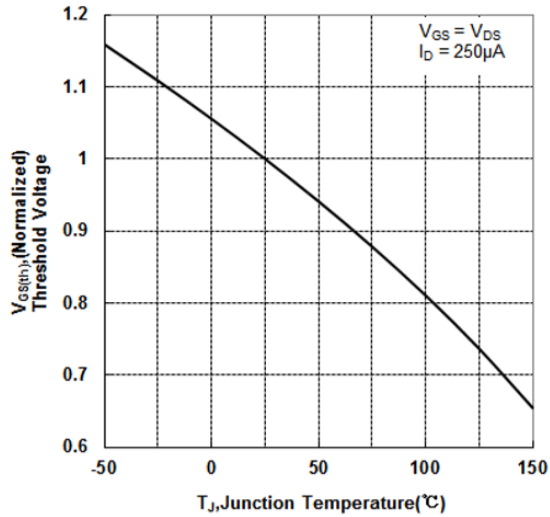


Figure 10 Typical Theshold Voltage vs Junction Temperature

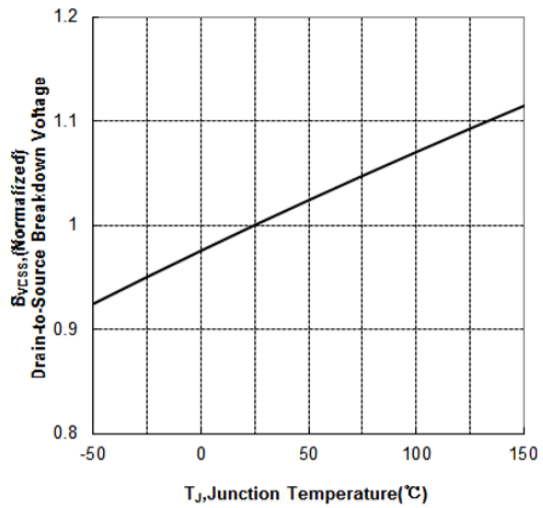


Figure 11 Typical Breakdown Voltage vs Junction Temperature

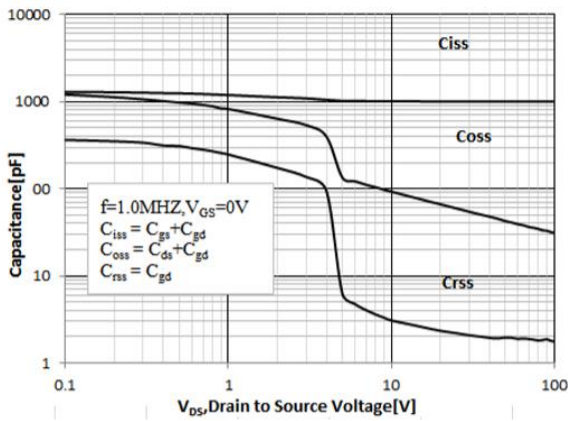


Figure 12 Typical Capacitance vs Drain to Source Voltage

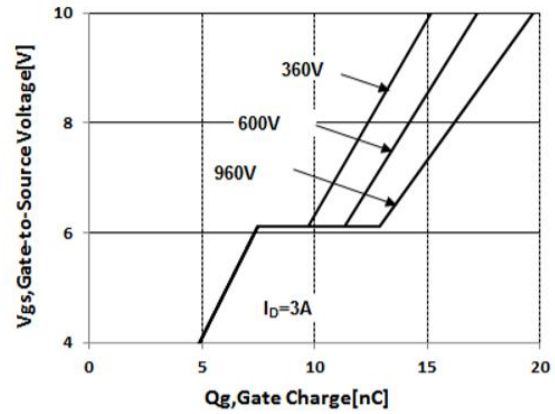
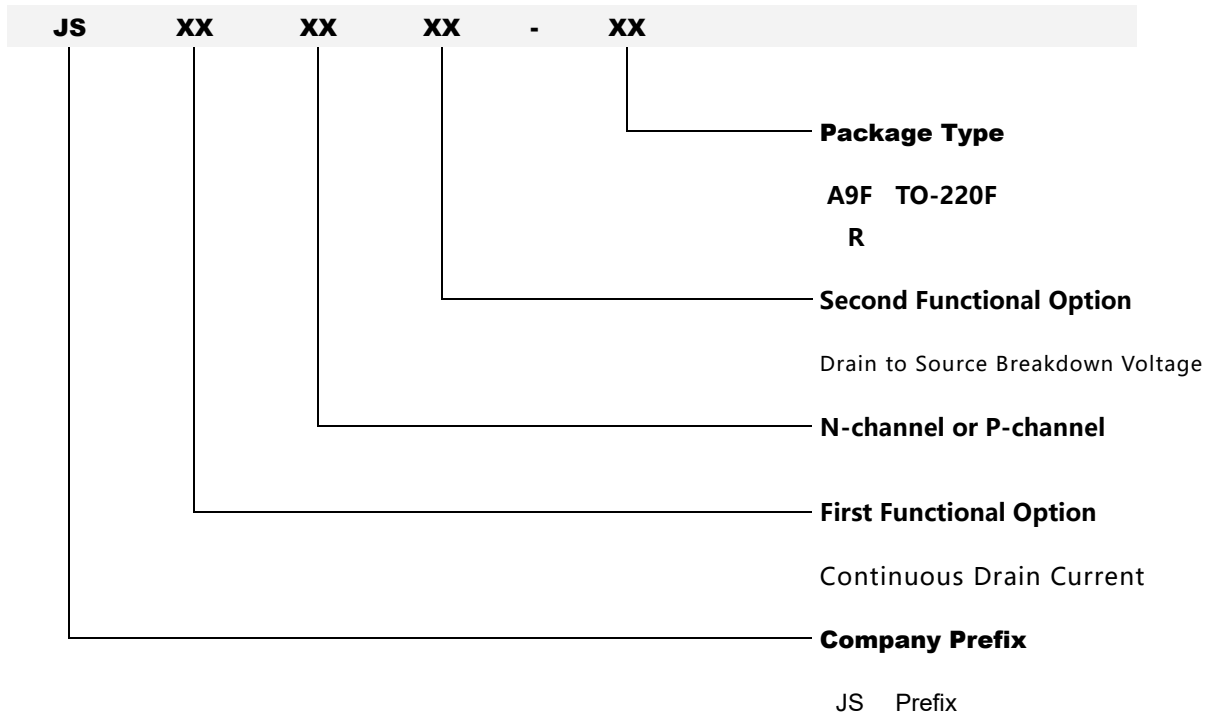


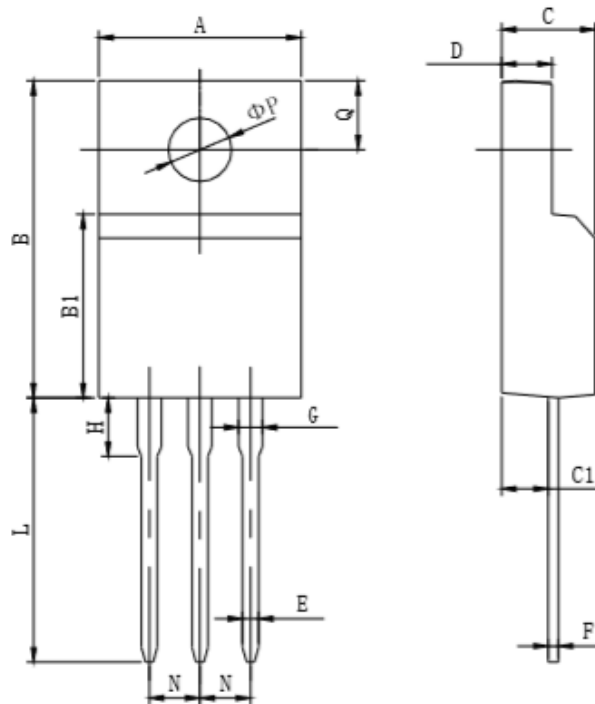
Figure 13 Typical Gate Charge vs Gate to Source Voltage

Marking Information



	Part NO.
●	Y M W SN
Part NO.	JS3N120A9FR
●	Pin 1 Indicator
Lot NO.	Y: Year; M: Month; W: Week; SN: Pipeline Code

Package Information



Items	Values(mm)	
	MIN	MAX
A	9.60	10.4
B	15.4	16.2
B1	8.90	9.50
C	4.30	4.90
C1	2.10	3.00
D	2.40	3.00
E	0.60	1.00
F	0.30	0.60
G	1.12	1.42
H	3.40	3.80
	1.60	2.90
L*	12.0	14.0
N	2.34	2.74
Q	3.15	3.55
Φ P	2.90	3.30

Revision History

Revision	Date	Descriptions
REV.1.1	Sep., 2018	"Typical Performance Characteristics" Update
REV.1.0	July, 2017	Initial Version