

General Description:

JS90N20AN is the silicon N-channel Enhanced VDMOSFET, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-3P(N), which accords with the RoHS standard.

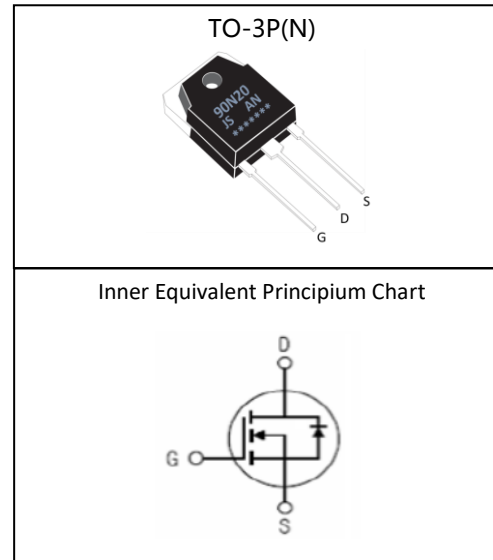
Features:

- Fast Switching
- ESD Improved Capability
- Low Gate Charge
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

Applications:

- Power switch circuit of POWER
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)

$V_{DSS}(T_C=150^{\circ}C)$	200	V
I_D	90	A
$P_D(T_C=25^{\circ}C)$	600	W
$R_{DS(ON)MAX}$	23	m Ω



Package Marking and Ordering Information:

Device Marking	Device	Device Package	Quantity
JS90N20AN	JS90N20AN	TO-3P(N)	30 units

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

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	200	V
I_D	Continuous Drain Current	90	A
	Continuous Drain Current $T_C=100^{\circ}C$	70	A
I_{DM}^{a1}	Pulsed Drain Current (pulse width limited by T_{JM})	380	A
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy	2800	mJ
E_{AR}^{a1}	Avalanche Energy, Repetitive	250	mJ
I_{AR}^{a1}	Avalanche Current	60	A
dv/dt^{a2}	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	600	W
	Derating Factor above 25°C	3.8	W/°C
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	°C
T_L	Maximum Temperature for Soldering	300	°C

Caution Stresses greater than those in the "Absolute Maximum Ratings" may cause permanent damage to the device

Electrical Characteristics (Tc=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	200	--	--	V
I _{DSS}	Drain to Source Leakage Current	V _{DS} =200V, V _{GS} =0V, T _a =25°C	--	--	1.0	μA
		V _{DS} =160V, V _{GS} =0V, T _a =125°C	--	--	100	
I _{GSS(F)}	Gate to Source Forward Leakage	V _{GS} =+20V	--	--	100	nA
I _{GSS(R)}	Gate to Source Reverse Leakage	V _{GS} =-20V	--	--	-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 =40A	--	18	23	mΩ
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2.0	--	4.0	V
g _{fs}	Forward Trans conductance	V _{DS} =15V, I _D =40A	--	65	--	S
Pulse width < 380μs; duty cycle < 2%.						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C _{iss}	Input Capacitance	V _{GS} =0V V _{DS} =25V f=1.0MHz	--	6280	--	pF
C _{oss}	Output Capacitance		--	980	--	
C _{rss}	Reverse Transfer Capacitance		--	370	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D =90A, V _{DD} =100V V _{GS} =10V, R _G =25Ω	--	45	--	ns
t _r	Rise Time		--	70	--	
t _{d(OFF)}	Turn-Off Delay Time		--	110	--	
t _f	Fall Time		--	90	--	
Q _g	Total Gate Charge	I _D =90A, V _{DD} =160V V _{GS} =10V	--	200	--	nC
Q _{gs}	Gate to Source Charge		--	28	--	
Q _{gd}	Gate to Drain ("Miller") Charge		--	60	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_{SD}	Continuous Source Current (Body Diode)		--	--	90	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	360	A
V_{SD}	Diode Forward Voltage	$I_S=90A, V_{GS}=0V$	--	--	1.4	V
t_{rr}	Reverse Recovery Time	$I_S=90A, T_j=25^\circ C$	--	280	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F/dt=100A/\mu s, V_{GS}=0V$	--	2.4	--	μC

Thermal Characteristics

Symbol	Parameter	Rating	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.21	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	$^\circ C/W$

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

a2: $I_{SD}=90A, di/dt \leq 100A/\mu s, V_{DD} \leq BV_{DS}$, Start $T_j=25^\circ C$

Test Circuits and Waveforms

Figure A: Gate Charge Test Circuit and Waveform

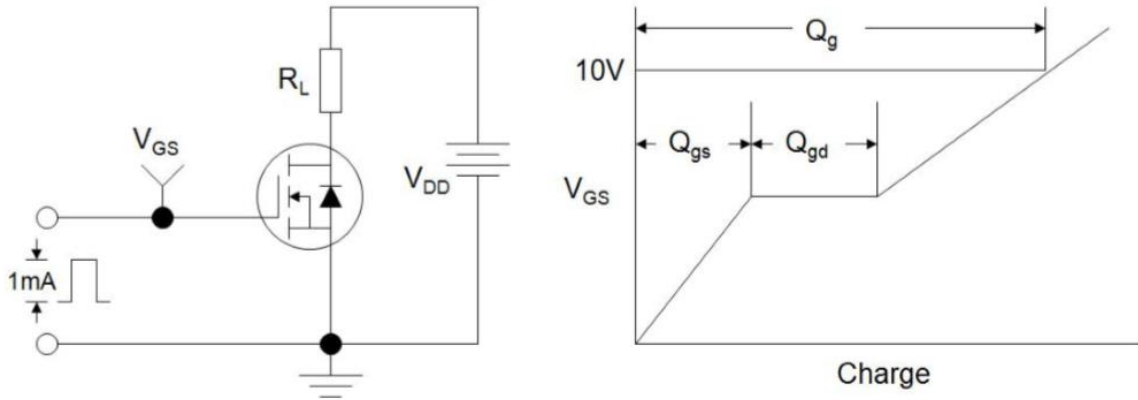


Figure B: Resistive Switching Test Circuit and Waveform

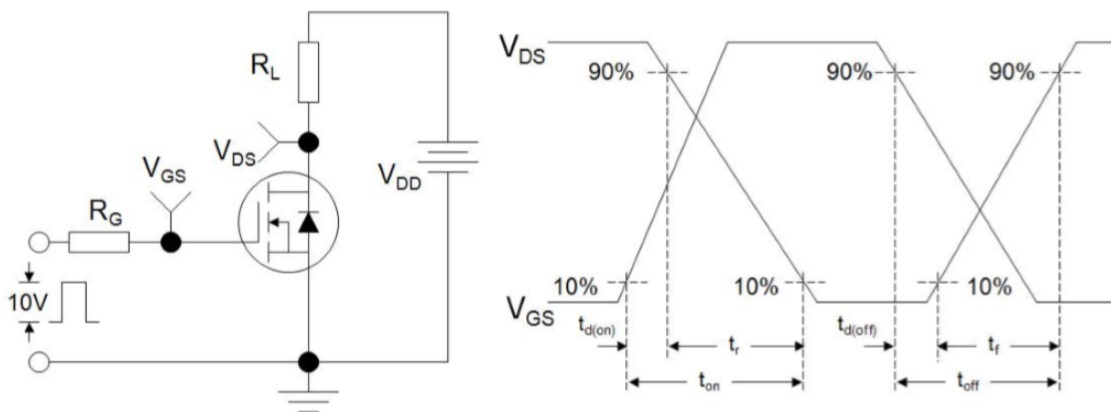
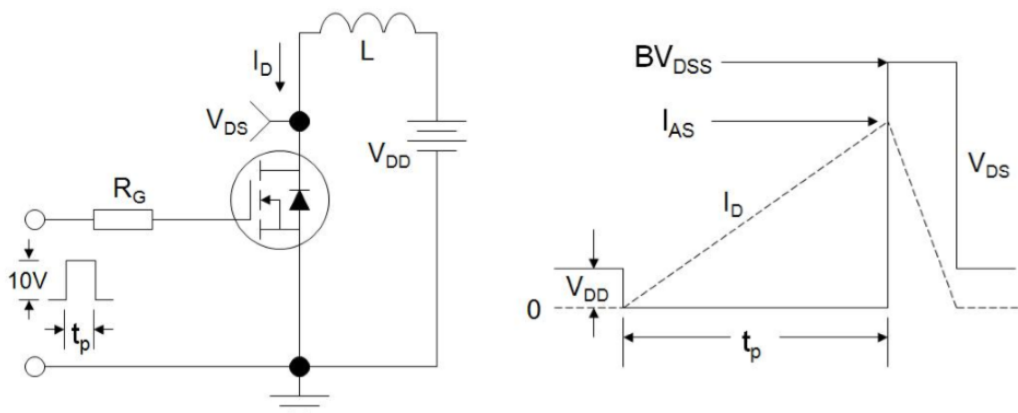


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



Characteristics Curve:

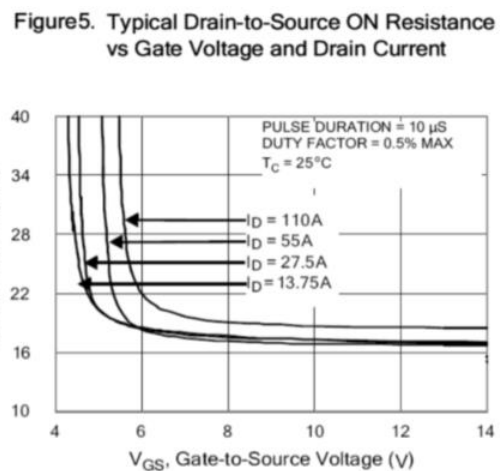
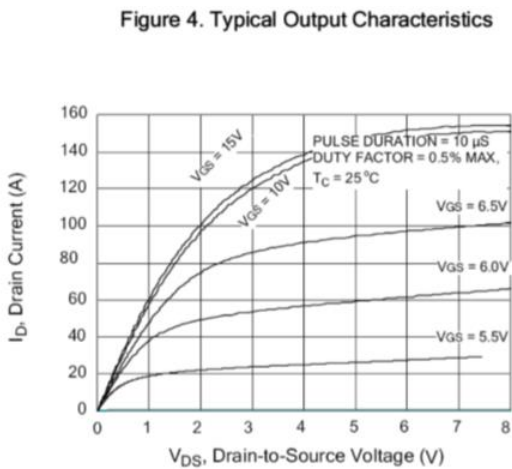
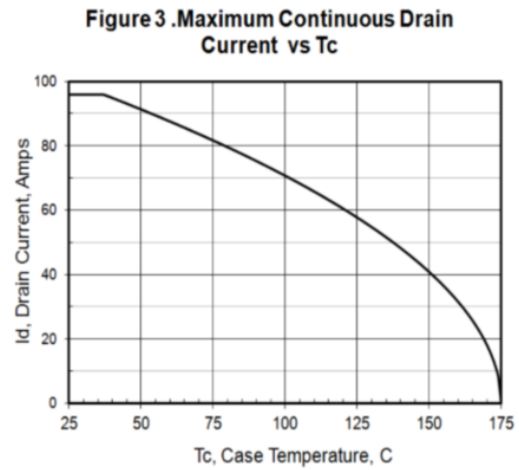
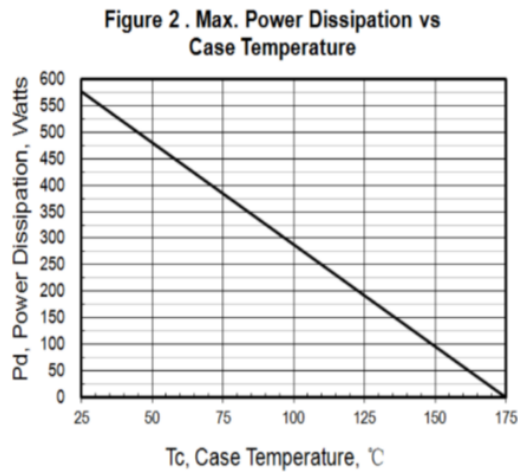
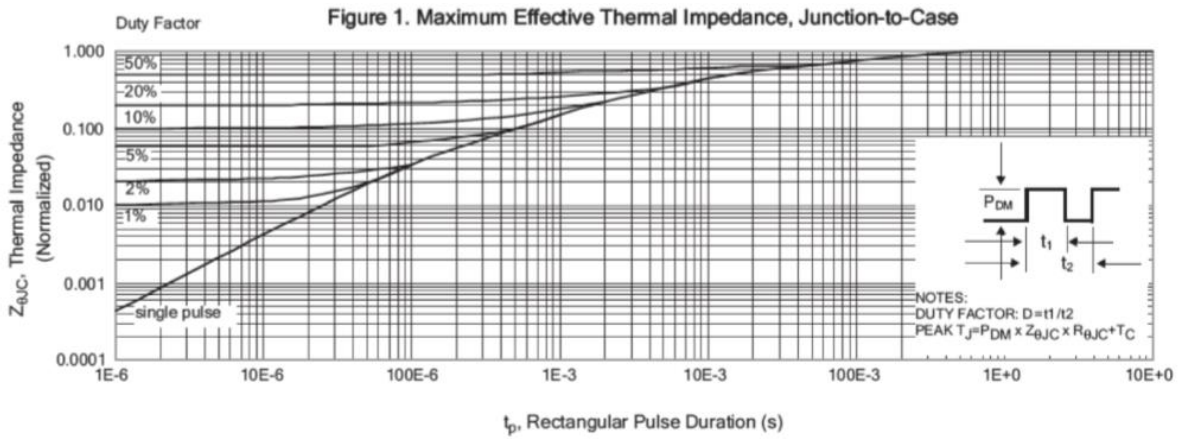


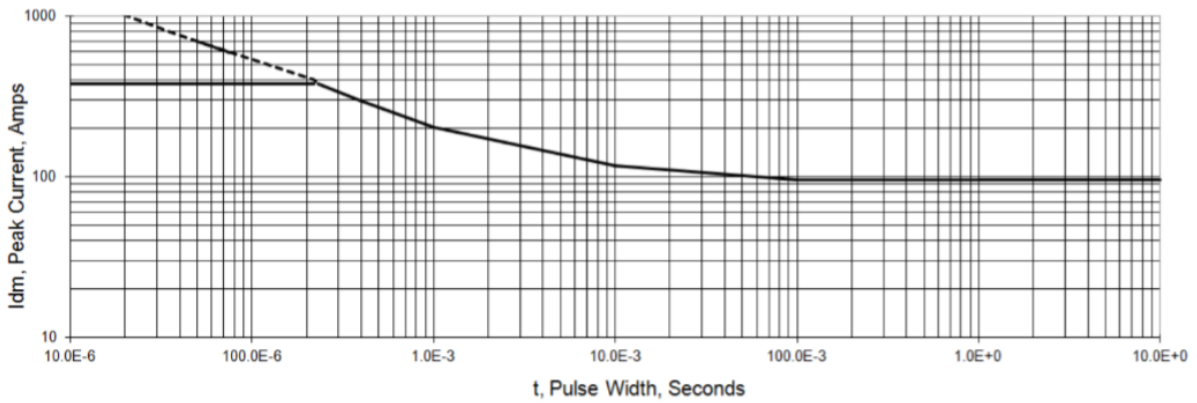
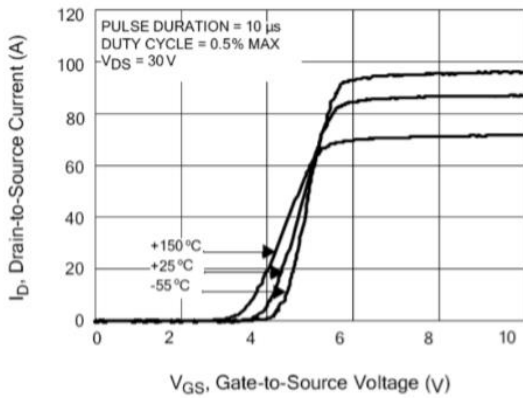
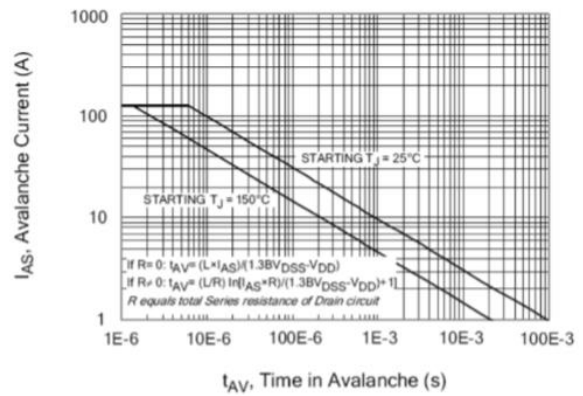
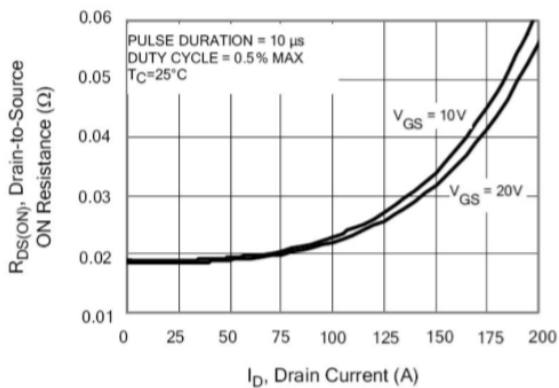
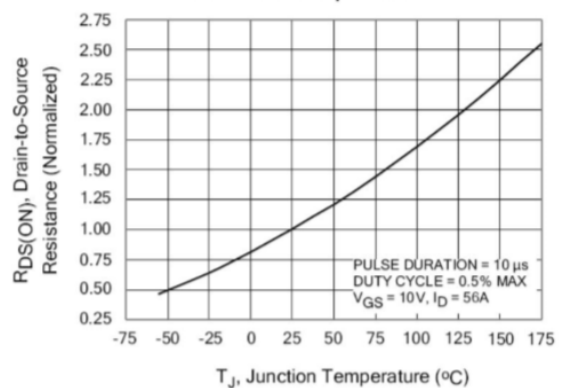
Figure 6. Peak Current Capability

Figure 7. Typical Transfer Characteristics

Figure 8. Unclamped Inductive Switching Capability

Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature


Figure 11. Typical Breakdown Voltage vs Junction Temperature

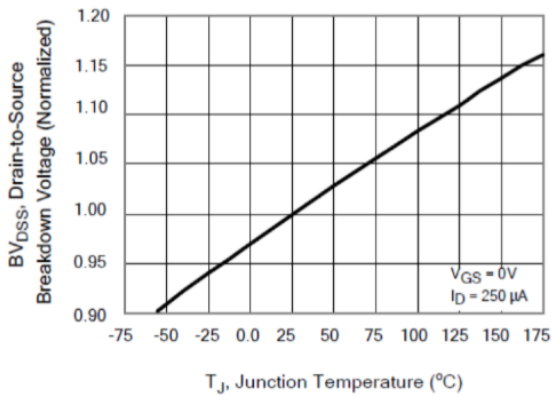


Figure 12. Typical Threshold Voltage vs Junction Temperature

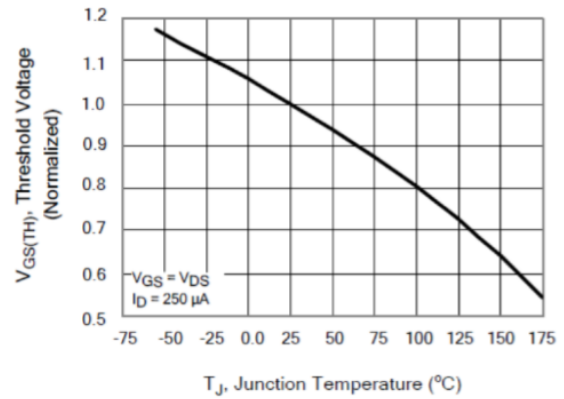


Figure 13. Maximum Safe Operating Area

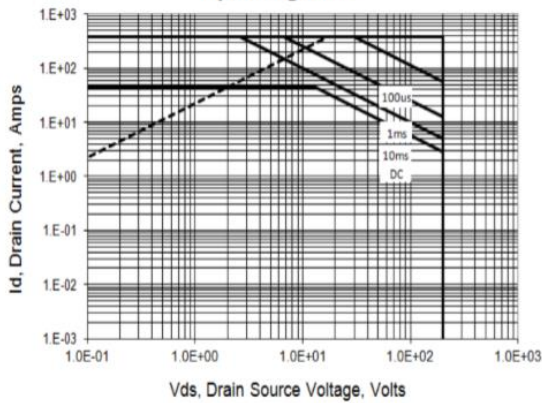


Figure 14. Capacitance vs Vds

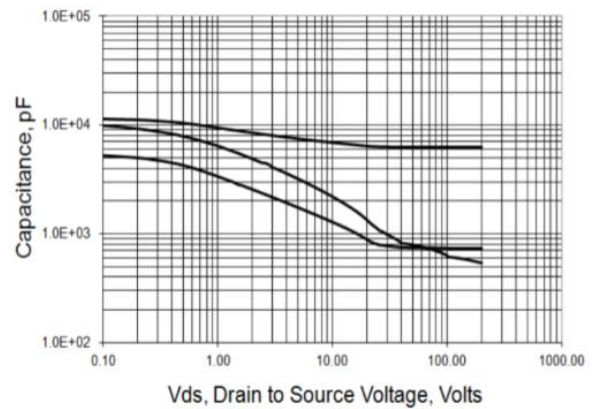


Figure 15. Typical Gate Charge

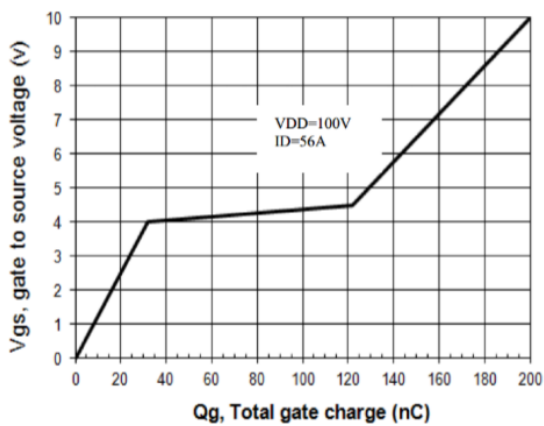
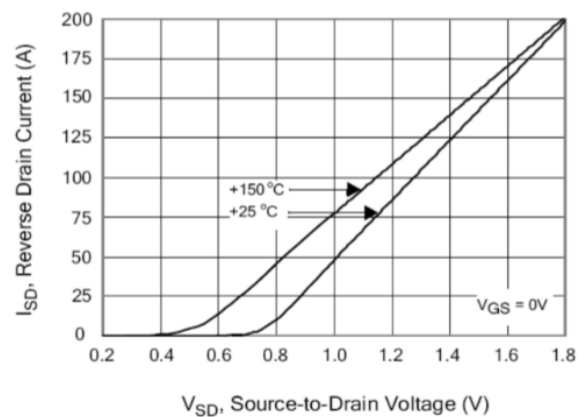
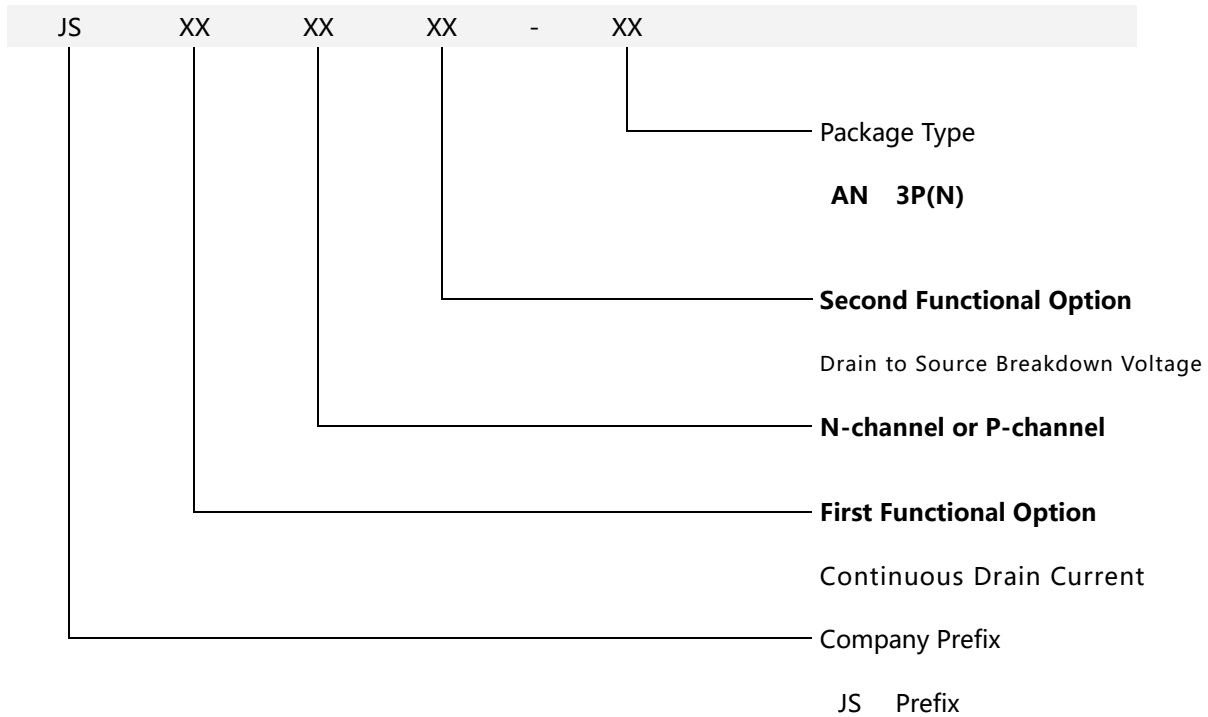


Figure 16. Typical Body Diode Transfer Characteristics

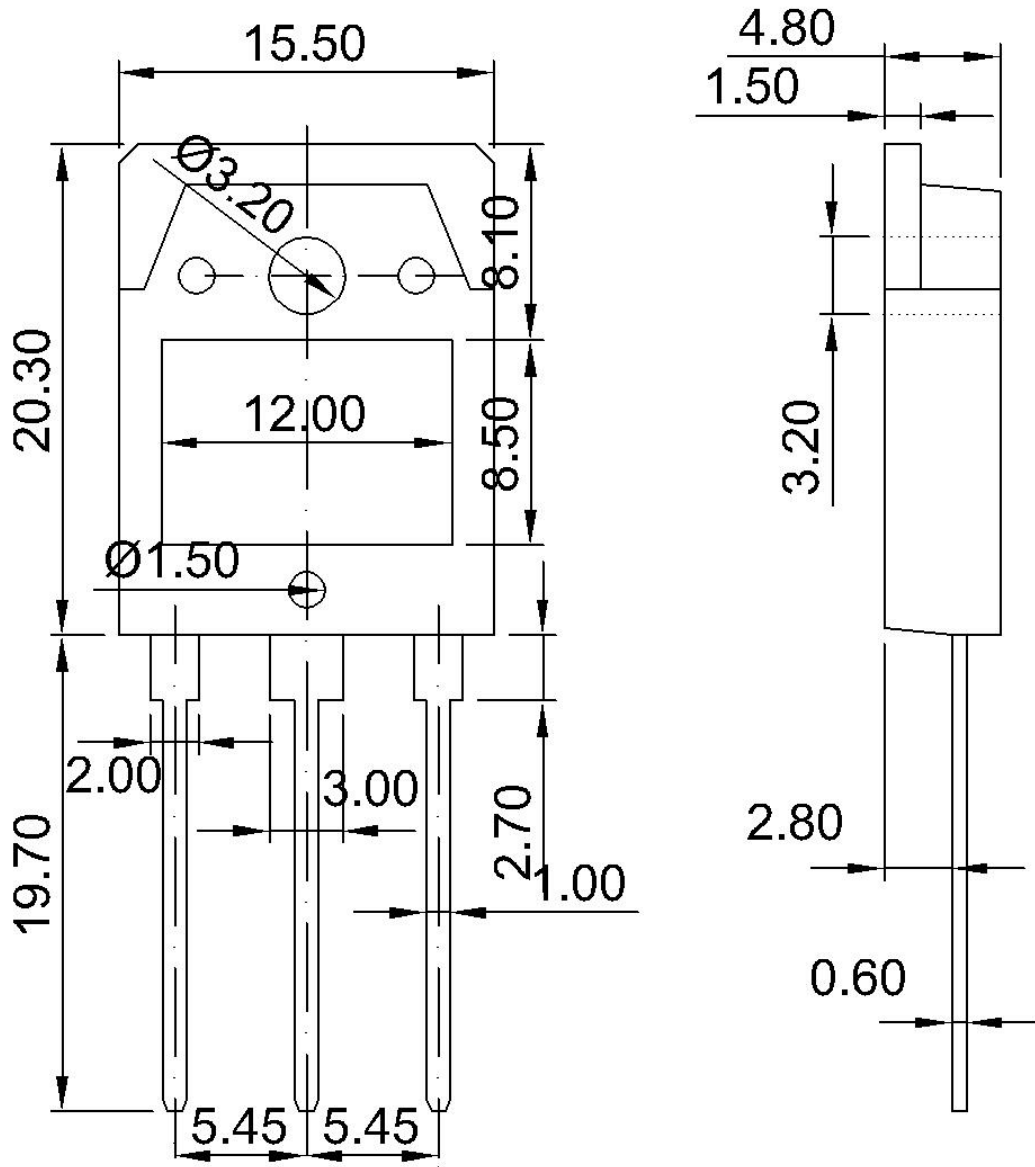


Marking Information



	Y	M	W	SN
Part NO.	JS90N20AN			
Lot NO.	Y: Year; M: Month; W: Week; SN: Pipeline Code			

Package Information



Revision History

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