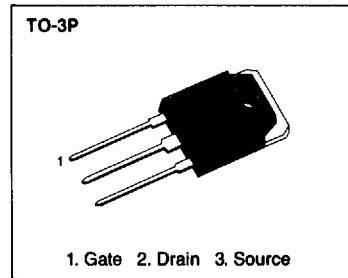


## FEATURES

- Lower  $R_{DS(on)}$
- Improved inductive ruggedness
- Fast switching times
- Rugged polysilicon gate cell structure
- Lower input capacitance
- Extended safe operating area
- Improved high temperature reliability



## PRODUCT SUMMARY

Part Number	V <sub>DS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
SSH5N90	900V	2.5 $\Omega$	5A

## ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	SSH5N90	Unit
Drain-Source Voltage (1)	V <sub>DSS</sub>	900	V <sub>dc</sub>
Drain-Gate Voltage (R <sub>GS</sub> =1.0M $\Omega$ ) (1)	V <sub>DGR</sub>	900	V <sub>dc</sub>
Gate-Source Voltage	V <sub>GS</sub>	$\pm 30$	V <sub>dc</sub>
Continuous Drain Current T <sub>c</sub> =25 °C	I <sub>D</sub>	5.0	A <sub>dc</sub>
Continuous Drain Current T <sub>c</sub> =100 °C	I <sub>D</sub>	3.5	A <sub>dc</sub>
Drain Current - Pulsed (3)	I <sub>DM</sub>	20.0	A <sub>dc</sub>
Single Pulsed Avalanche Energy (4)	E <sub>AS</sub>	430	mJ
Avalanche Current	I <sub>AS</sub>	5.0	A
Total Power Dissipation at T <sub>c</sub> =25 °C	P <sub>D</sub>	150	Watts
Derate Above 25 °C		1.20	W/ °C
Operating and Storage Junction Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	T <sub>L</sub>	300	°C

Notes : (1) T<sub>J</sub>=25°C to 150°C

(2) Pulse test : Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$

(3) Repetitive rating : Pulse width limited by junction temperature

(4) L=51mH, V<sub>dd</sub>=50V, R<sub>G</sub>=25 $\Omega$ , Starting T<sub>J</sub>=25°C

**ELECTRICAL CHARACTERISTICS** ( $T_C=25^\circ\text{C}$  unless otherwise specified)

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$BV_{DSS}$	Drain-Source Breakdown Voltage	900	-	-	V	$V_{GS}=0V, I_D=250\mu A$
$V_{GS(th)}$	Gate Threshold Voltage	2.0	-	4.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$
$I_{GSS}$	Gate-Source Leakage Forward	-	-	100	nA	$V_{GS}=20V$
$I_{GSS}$	Gate-Source Leakage Reverse	-	-	-100	nA	$V_{GS}=-20V$
$I_{DSS}$	Zero Gate Voltage Drain Current	-	-	250	$\mu A$	$V_{DS}=\text{Max. Rating}, V_{GS}=0V$
		-	-	1000	$\mu A$	$V_{DS}=0.8 \text{ Max. Rating}, V_{GS}=0V, T_C=150^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance(2)	-	1.7	2.5	$\Omega$	$V_{GS}=10V, I_D=2.5A$
$g_{fs}$	Forward Transconductance (2)	3.5	-	-	$\text{U}$	$V_{DS}=15V, I_D=2.5A$
$C_{iss}$	Input Capacitance	-	1700	-	pF	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$
$C_{oss}$	Output Capacitance	-	140	-	pF	
$C_{rss}$	Reverse Transfer Capacitance	-	60	-	pF	
$t_{d(on)}$	Turn-On Delay Time	-	40	-	ns	$V_{DD}=0.5 BV_{DSS}, I_D=5.0A, Z_\theta=9.1\Omega$ (MOSFET switching times are essentially independent of operating temperature)
$t_r$	Rise Time	-	90	-	ns	
$t_{d(off)}$	Turn-Off Delay Time	-	250	-	ns	
$t_f$	Fall Time	-	100	-	ns	
$Q_g$	Total Gate Charge (Gate-Source Plus Gate-Drain)	-	-	110	nC	$V_{GS}=10V, I_D=5A, V_{DS}=0.8 \text{ Max. Rating}$ (Gate charge is essentially independent of operating temperature)
$Q_{gs}$	Gate-Source Charge	-	13	-	nC	
$Q_{gd}$	Gate-Drain ("Miller") Charge	-	40	-	nC	

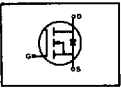
**THERMAL RESISTANCE**

Symbol	Characteristics		SSH5N90	Units	Remark
$R_{thJC}$	Junction-to-Case	MAX	0.73	K/W	
$R_{thCS}$	Case-to-Sink	TYP	0.24	K/W	Mounting surface flat
$R_{thJA}$	Junction-to-Ambient	MAX	40	K/W	Free Air Operation

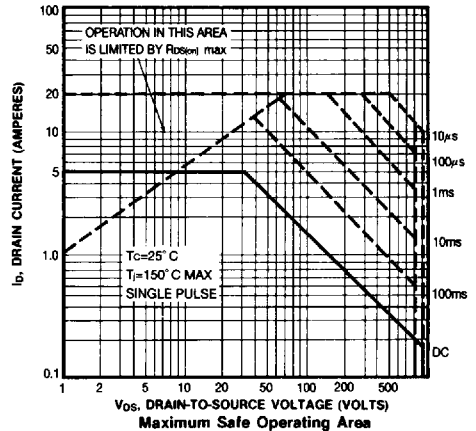
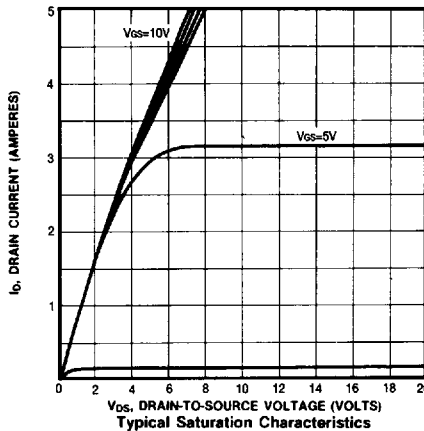
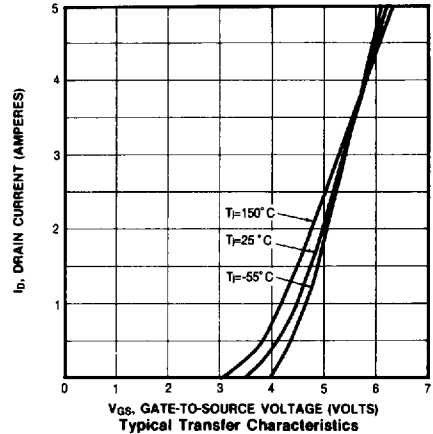
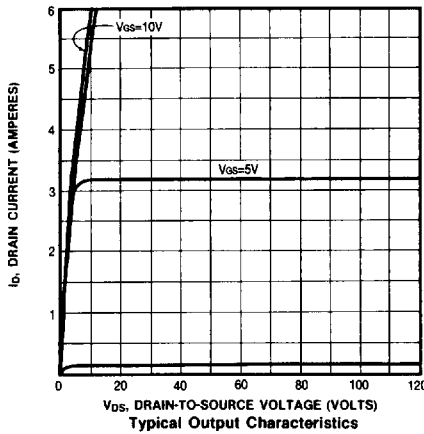
Notes : (1)  $T_J=25^\circ\text{C}$  to  $150^\circ\text{C}$ (2) Pulse test : Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ 

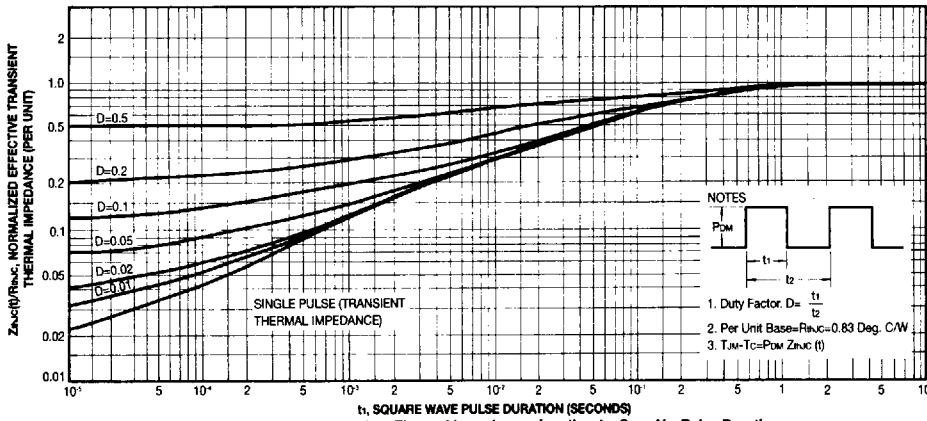
(3) Repetitive rating : Pulse width limited by max. junction temperature

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

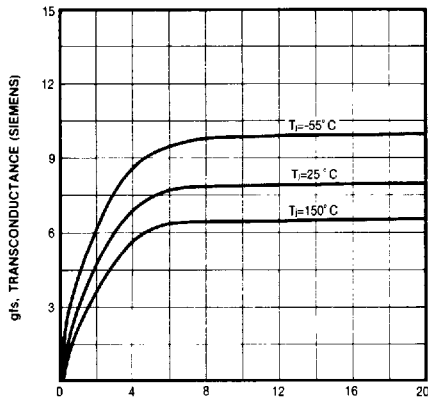
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode)	-	-	5	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
$I_{SM}$	Pulse Source Current (Body Diode) (3)	-	-	20	A	
$V_{SD}$	Diode Forward Voltage (2)	-	-	1.5	V	$T_J=25^\circ\text{C}$ , $I_S=5\text{A}$ , $V_{GS}=0\text{V}$
$t_{rr}$	Reverse Recovery Time	-	500	-	ns	$T_J=25^\circ\text{C}$ , $I_F=5\text{A}$ , $dI_F/dt=100\text{A}/\mu\text{S}$

- Notes : (1)  $T_J=25^\circ\text{C}$  to  $150^\circ\text{C}$   
 (2) Pulse test : Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$   
 (3) Repetitive rating : Pulse width limited by max. junction temperature

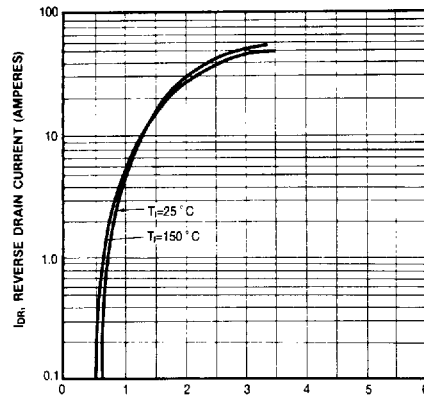




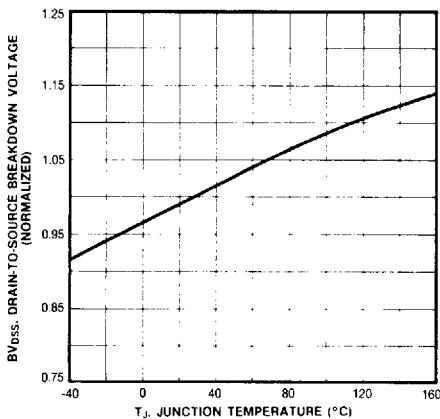
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



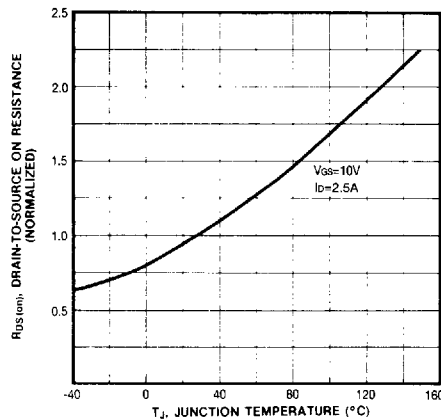
Typical Transconductance Vs. Drain Current



Typical Source-Drain Diode Forward Voltage

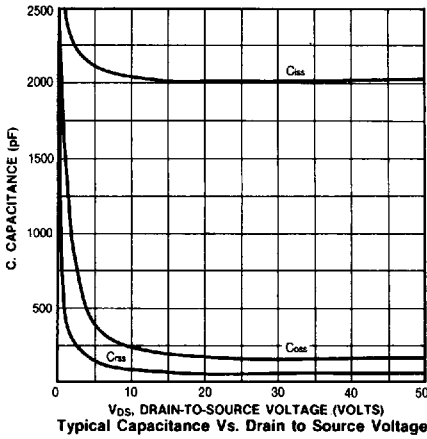


Breakdown Voltage Vs. Temperature

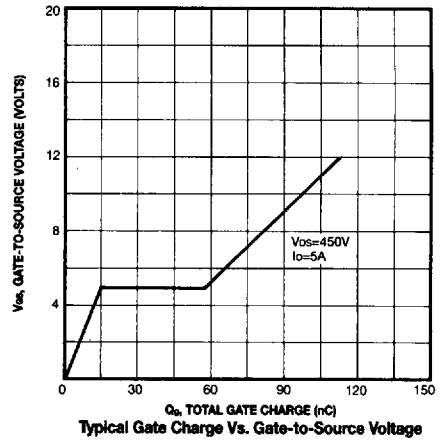


Normalized On-Resistance Vs. Temperature

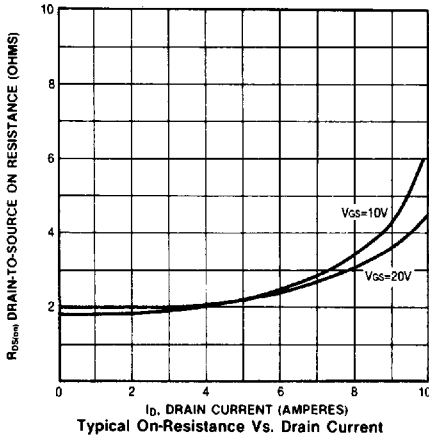
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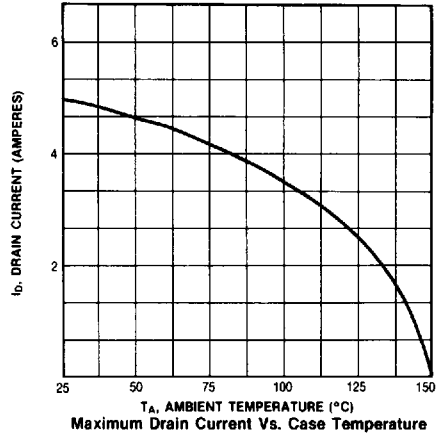
Typical Capacitance Vs. Drain to Source Voltage



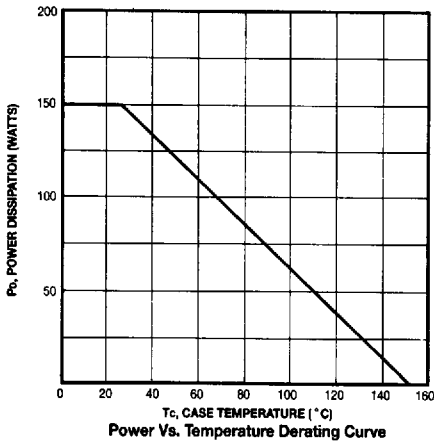
Typical Gate Charge Vs. Gate-to-Source Voltage



Typical On-Resistance Vs. Drain Current



Maximum Drain Current Vs. Case Temperature



Power Vs. Temperature Derating Curve