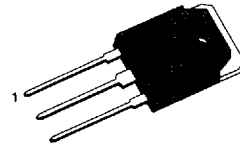


## FEATURES

- 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

TO-3P



1. Gate 2. Drain 3. Source

## PRODUCT SUMMARY

Part Number	BV <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
SSH40N20	200V	0.080 $\Omega$	40A
SSH40N15	150V	0.080 $\Omega$	40A

## ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	SSH40N20	SSH40N15	Unit
Drain-Source Voltage (1)	V <sub>DSS</sub>	200	150	V <sub>dc</sub>
Drain-Gate Voltage (R <sub>GS</sub> =1.0M $\Omega$ )(1)	V <sub>DGR</sub>	200	150	V <sub>dc</sub>
Gate-Source Voltage	V <sub>GS</sub>	$\pm 20$		V <sub>dc</sub>
Continuous Drain Current T <sub>c</sub> =25 °C	I <sub>D</sub>	40		A <sub>dc</sub>
Continuous Drain Current T <sub>c</sub> =100 °C	I <sub>D</sub>	28		A <sub>dc</sub>
Drain Current - Pulsed (3)	I <sub>DM</sub>	160		A <sub>dc</sub>
Gate Current - Pulsed	I <sub>GM</sub>	$\pm 1.5$		A <sub>dc</sub>
Single Pulsed Avalanche Energy (4)	E <sub>AS</sub>	840		mJ
Avalanche Current	I <sub>AS</sub>	40		A
Total Power Dissipation at T <sub>c</sub> =25 °C	P <sub>D</sub>	230		Watts
Derate above 25 °C		1.82		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 < 300 $\mu$ s, Duty Cycle < 2%

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

(4) L=1mH, V<sub>dd</sub>= 50V, R<sub>G</sub>=25  $\Omega$ , Starting T<sub>J</sub>=25°C

ELECTRICAL CHARACTERISTICS (T<sub>c</sub>=25°C unless otherwise specified)

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage					
	SSH40N20	100	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
	SSH40N15	150	-	-	V	
V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	-	4.5	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
I <sub>GSS</sub>	Gate-Source Leakage Forward	-	-	100	nA	V <sub>GS</sub> =20V
I <sub>GSS</sub>	Gate-Source Leakage Reverse	-	-	-100	nA	V <sub>GS</sub> =-20V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	-	-	250	μA	V <sub>DS</sub> =Max. Rating, V <sub>GS</sub> =0V
		-	-	1000	μA	V <sub>DS</sub> =0.8 Max. Rating, V <sub>GS</sub> =0V, T <sub>c</sub> =150°C
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance(2)	-	-	0.080	Ω	V <sub>GS</sub> =10V, I <sub>D</sub> =20A
g <sub>fs</sub>	Forward Transconductance (2)	10	-	-	Ω	V <sub>DS</sub> ≥50V, I <sub>D</sub> =20A
C <sub>iss</sub>	Input Capacitance	-	4440	-	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz
C <sub>oss</sub>	Output Capacitance	-	770	-	pF	
C <sub>rss</sub>	Reverse Transfer Capacitance	-	300	-	pF	
t <sub>d(on)</sub>	Turn-On Delay Time	-	-	130	ns	V <sub>DS</sub> =0.5 BV <sub>DSS</sub> , I <sub>D</sub> =40A, Z <sub>o</sub> =9.1Ω (MOSFET switching times are essentially independent of operating temperature)
t <sub>r</sub>	Rise Time	-	-	280	ns	
t <sub>d(off)</sub>	Turn-Off Delay Time	-	-	630	ns	
t <sub>f</sub>	Fall Time	-	-	210	ns	
Q <sub>g</sub>	Total Gate Charge (Gate-Source Plus Gate-Drain)	-	-	160	nC	V <sub>GS</sub> =10V, I <sub>D</sub> =40A, V <sub>DS</sub> =0.8 Max. Rating (Gate charge is essentially independent of operating temperature)
Q <sub>gs</sub>	Gate-Source Charge	-	27	-	nC	
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	-	66	-	nC	

## THERMAL RESISTANCE

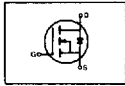
Symbol	Characteristics		All	Units	Remark
R <sub>thJC</sub>	Junction-to-Case	MAX	0.55	K/W	
R <sub>thCS</sub>	Case-to-Sink	TYP	0.24	K/W	Mounting surface flat
R <sub>thJA</sub>	Junction-to-Ambient	MAX	40	K/W	Free Air Operation

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

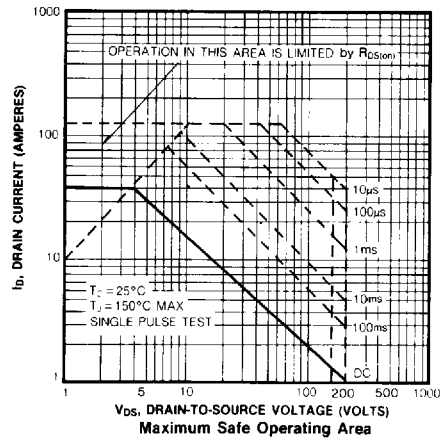
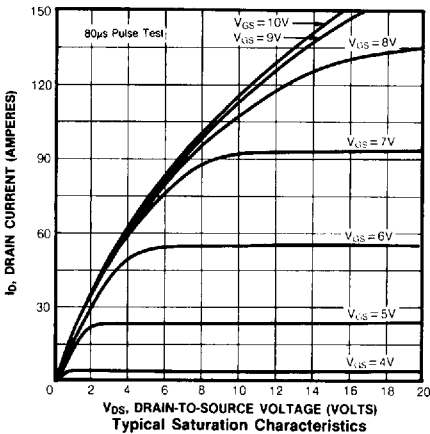
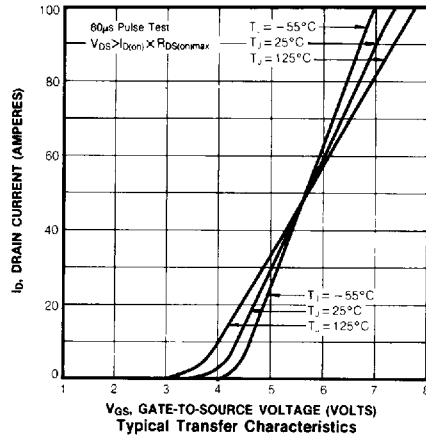
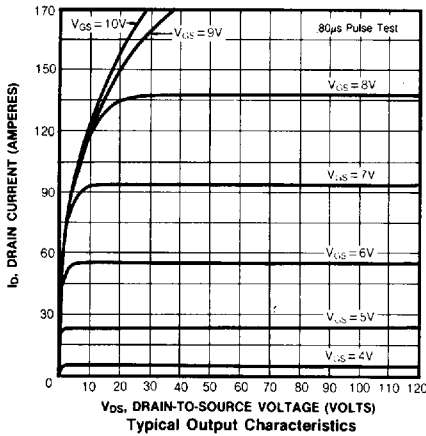
(2) Pulse test : Pulse width &lt; 300μs, Duty Cycle &lt; 2%

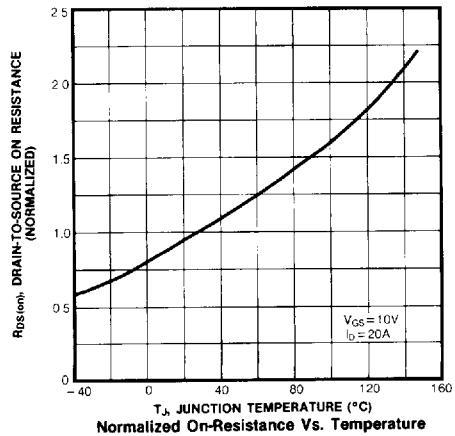
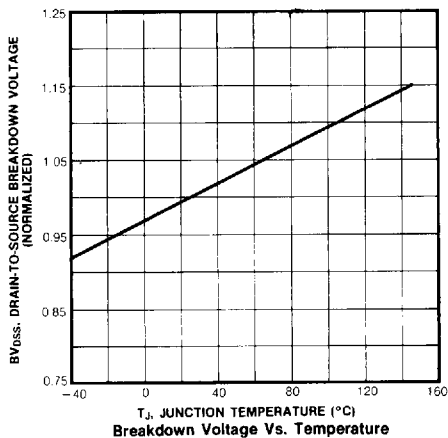
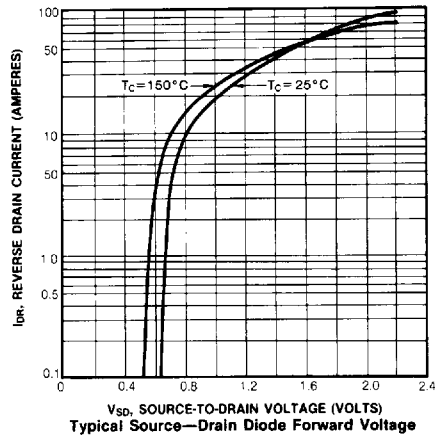
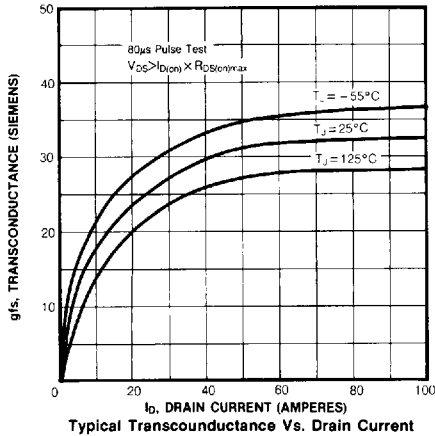
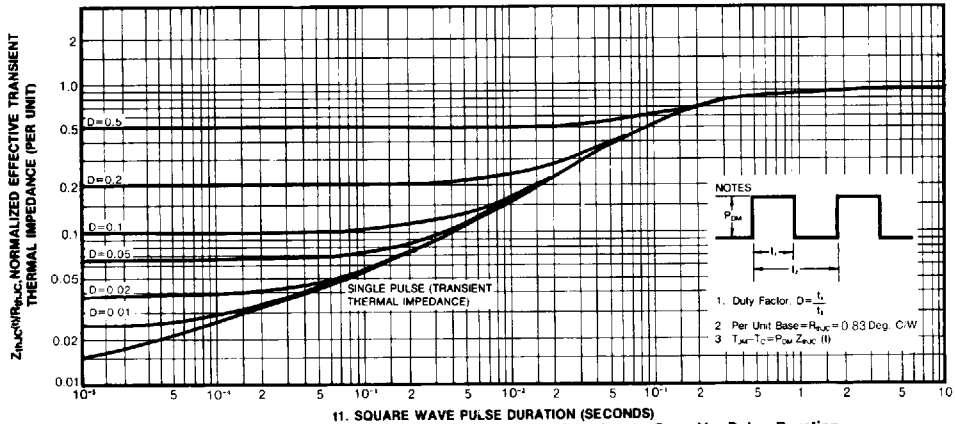
(3) Repetitive rating : Pulse width limited by junction temperature

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	-	-	40	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
I <sub>SM</sub>	Pulse Source Current (Body Diode) (3)	-	-	160	A	
V <sub>SD</sub>	Diode Forward Voltage (2)	-	-	2.5	V	T <sub>J</sub> =25°C, I <sub>S</sub> =40A, V <sub>GS</sub> =0V
t <sub>rr</sub>	Reverse Recovery Time	-	900	-	ns	T <sub>J</sub> =25°C, I <sub>F</sub> =40A, dI <sub>F</sub> /dt=100A/μS

- Notes : (1) T<sub>J</sub>=25°C to 150°C  
 (2) Pulse test : Pulse width < 300μs, Duty Cycle < 2%  
 (3) Repetitive rating : Pulse width limited by junction temperature





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