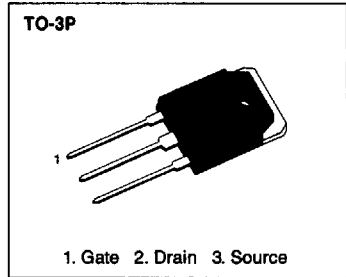


## FEATURES

- 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	$V_{DSS}$	$R_{DS(on)}$	$I_D$
SSH20N50	500V	$0.3\Omega$	20A
SSH20N45	450V	$0.3\Omega$	20A

## ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	SSH20N50	SSH20N45	Unit
Drain-Source Voltage (1)	$V_{DSS}$	500	450	Vdc
Drain-Gate Voltage ( $R_{GS}=1.0M\Omega$ )(1)	$V_{DGR}$	500	450	Vdc
Gate-Source Voltage	$V_{GS}$	$\pm 20$		Vdc
Continuous Drain Current $T_c=25^\circ C$	$I_D$	20		Adc
Continuous Drain Current $T_c=100^\circ C$	$I_D$	14		Adc
Drain Current - Pulsed (3)	$I_{DM}$	80		Adc
Gate Current - Pulsed	$I_{GM}$	$\pm 1.5$		Adc
Single Pulsed Avalanche Energy (4)	EAS	960		mJ
Avalanche Current	$I_{AS}$	20		A
Total Power Dissipation at $T_c=25^\circ C$	$P_D$	230		Watts
Derate above $25^\circ C$		1.82		W/ $^\circ C$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-55 to +150		$^\circ C$
Maximum Lead Temp. for Soldering Purposes, $1/8"$ from case for 5 seconds	$T_L$	300		$^\circ C$

Notes : (1)  $T_J=25^\circ C$  to  $150^\circ C$

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

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

(4)  $L=4.3mH$ ,  $V_d=50V$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ C$

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					
	SSH20N50	500	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
	SSH20N45	450	-	-	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)	-	-	0.3	Ω	V <sub>GS</sub> =10V, I <sub>D</sub> =10A
g <sub>fs</sub>	Forward Transconductance (2)	7.0	-	-	∅	V <sub>DS</sub> ≥50V, I <sub>D</sub> =10A
C <sub>iss</sub>	Input Capacitance	-	4260	-	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz
C <sub>oss</sub>	Output Capacitance	-	438	-	pF	
C <sub>rss</sub>	Reverse Transfer Capacitance	-	125	-	pF	
t <sub>d(on)</sub>	Turn-On Delay Time	-	-	130	ns	V <sub>DD</sub> =0.5 BV <sub>DSS</sub> , I <sub>D</sub> =20A, Z <sub>Θ</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	
Q <sub>gs</sub>	Gate-Source Charge	-	27	-	nC	V <sub>GS</sub> =10V, I <sub>D</sub> =20A, V <sub>DS</sub> =0.8 Max. Rating (Gate charge is essentially independent of operating temperature)
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	-	66	-	nC	

## THERMAL RESISTANCE

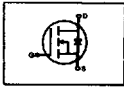
Symbol	Characteristics		All	Units	Remark
R <sub>thJC</sub>	Junction-to-Case	MAX	0.55	K/W	
R <sub>thCS</sub>	Case-to-Sink	TYP	0.24	K/W	Mounting surface flat
R <sub>thJA</sub>	Junction-to-Ambient	MAX	40	K/W	Free Air Operation

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

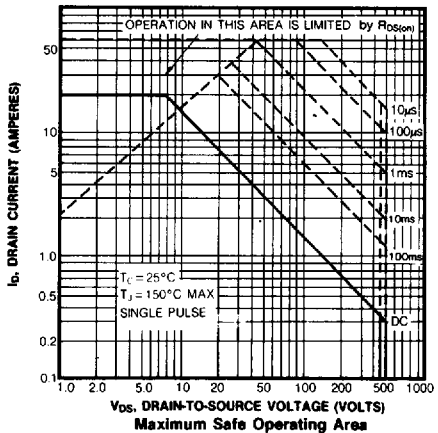
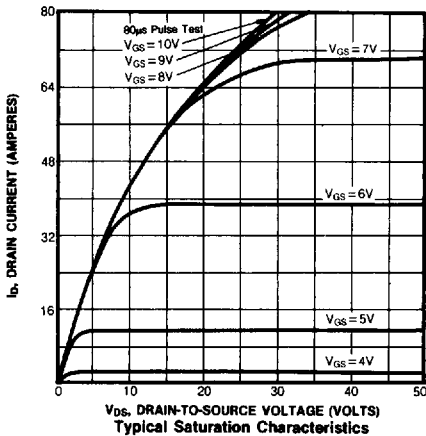
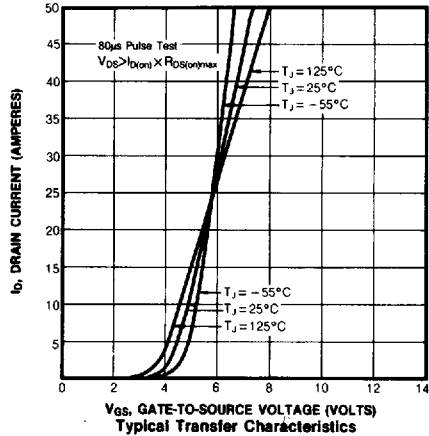
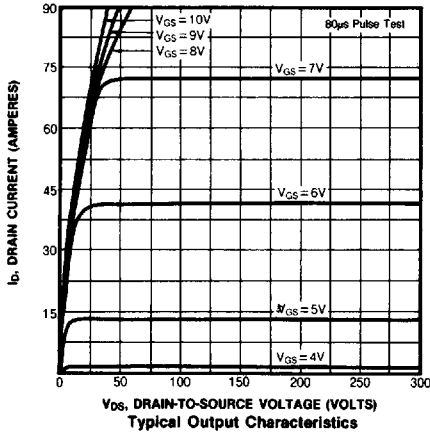
(2) Pulse test : Pulse width &lt; 300μs, Duty Cycle &lt; 2%

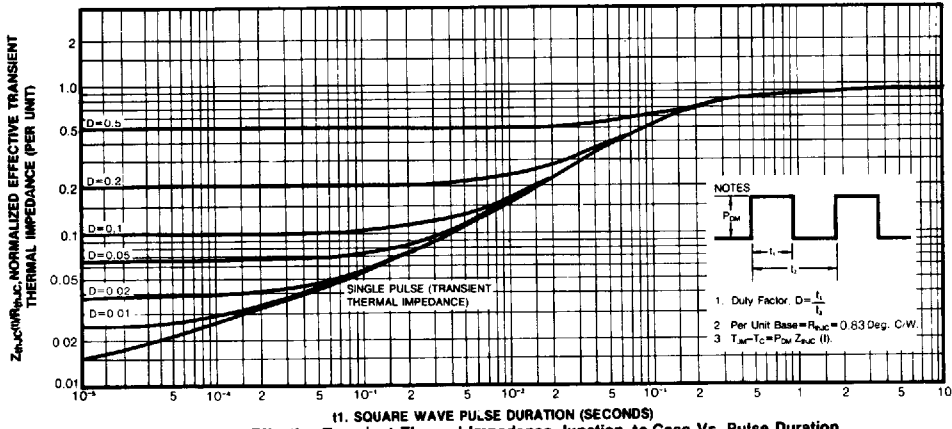
(3) Repetitive rating : Pulse width limited by junction temperature

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

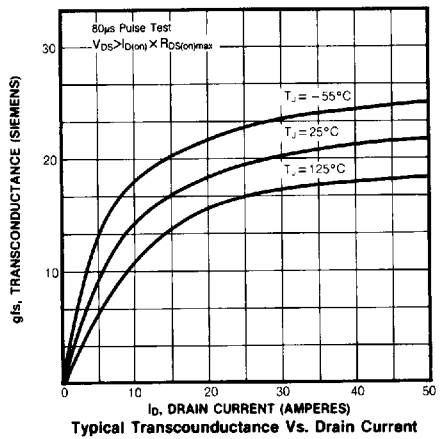
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode)	-	-	20	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
$I_{SM}$	Pulse Source Current (Body Diode) (3)	-	-	80	A	
$V_{SD}$	Diode Forward Voltage (2)	-	-	2.5	V	$T_J=25^\circ\text{C}$ , $I_S=20\text{A}$ , $V_{GS}=0\text{V}$
$t_{rr}$	Reverse Recovery Time	-	900	-	ns	$T_J=25^\circ\text{C}$ , $I_F=20\text{A}$ , $dI_F/dt=100\text{A}/\mu\text{S}$

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

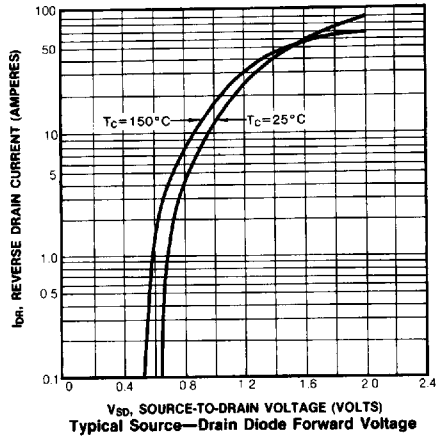




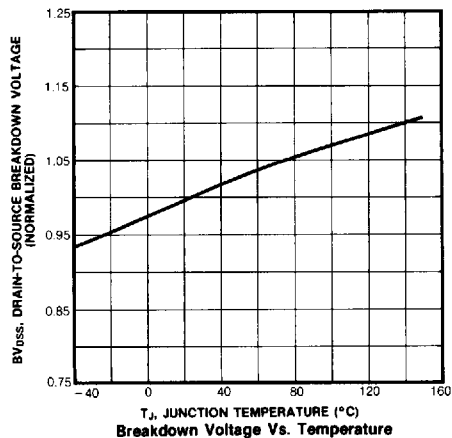
11. SQUARE WAVE PULSE DURATION (SECONDS)  
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



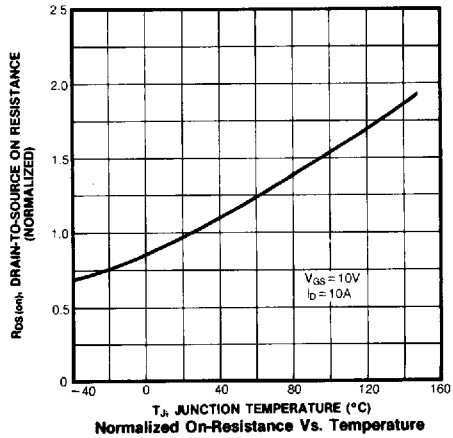
Typical Transconductance Vs. Drain Current



Typical Source-Drain Diode Forward Voltage



Breakdown Voltage Vs. Temperature



Normalized On-Resistance Vs. Temperature

