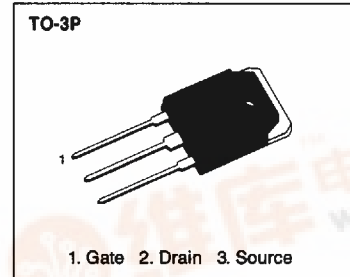


SSH20N50/45

N-CHANNEL POWER MOSFETS

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 | 0.3Ω | 20A |
| SSH20N45 | 450V | 0.3Ω | 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} | ±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} | ±1.5 | | Adc |
| Single Pulsed Avalanche Energy (4) | E_{AS} | 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/°C |
| Operating and Storage Junction Temperature Range | T_J, T_{STG} | -55 to +150 | | °C |
| Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds | T_L | 300 | | °C |

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

(2) Pulse test: Pulse width < 300μs, Duty Cycle < 2%

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

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



SSH20N50/45

N-CHANNEL POWER MOSFETS

ELECTRICAL CHARACTERISTICS (Tc=25°C unless otherwise specified)

| Symbol | Characteristic | Min | Typ | Max | Units | Test Conditions |
|---------------------|--|-----|------|------|-------|---|
| BV _{DSS} | Drain-Source Breakdown Voltage | | | | | |
| | SSH20N50 | 500 | - | - | V | V _{GS} =0V, I _D =250μA |
| | SSH20N45 | 450 | - | - | V | V _{GS} =0V, I _D =250μA |
| V _{GS(th)} | Gate Threshold Voltage | 2.0 | - | 4.5 | V | V _{DS} =V _{GS} , I _D =250μA |
| 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 | μA | V _{DS} =Max. Rating, V _{GS} =0V |
| | | - | - | 1000 | μA | V _{DS} =0.8 Max. Rating, V _{GS} =0V, T _C =150°C |
| R _{DS(on)} | Static Drain-Source On-Resistance(2) | - | - | 0.3 | Ω | V _{GS} =10V, I _D =10A |
| g _{fs} | Forward Transconductance (2) | 7.0 | - | - | U | V _{DS} ≥50V, I _D =10A |
| C _{iss} | Input Capacitance | - | 4260 | - | pF | V _{GS} =0V, V _{DS} =25V, f=1MHz |
| C _{oss} | Output Capacitance | - | 438 | - | pF | |
| C _{rss} | Reverse Transfer Capacitance | - | 125 | - | pF | |
| t _{d(on)} | Turn-On Delay Time | - | - | 130 | ns | V _{DD} =0.5 BV _{DSS} , I _D =20A, Z _Θ =9.1Ω (MOSFET switching times are essentially independent of operating temperature) |
| t _r | Rise Time | - | - | 280 | ns | |
| t _{d(off)} | Turn-Off Delay Time | - | - | 630 | ns | |
| t _f | Fall Time | - | - | 210 | ns | |
| Q _g | Total Gate Charge (Gate-Source Plus Gate-Drain) | - | - | 160 | nC | |
| Q _{gs} | Gate-Source Charge | - | 27 | - | nC | V _{GS} =10V, I _D =20A, V _{DS} =0.8 Max. Rating (Gate charge is essentially independent of operating temperature) |
| Q _{gd} | Gate-Drain ("Miller") Charge | - | 66 | - | nC | |

THERMAL RESISTANCE


| Symbol | Characteristics | | All | Units | Remark |
|-------------------|---------------------|-----|------|-------|-----------------------|
| R _{thJC} | Junction-to-Case | MAX | 0.55 | 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°C to 150°C
 (2) Pulse test : Pulse width < 300μs, Duty Cycle < 2%
 (3) Repetitive rating : Pulse width limited by junction temperature

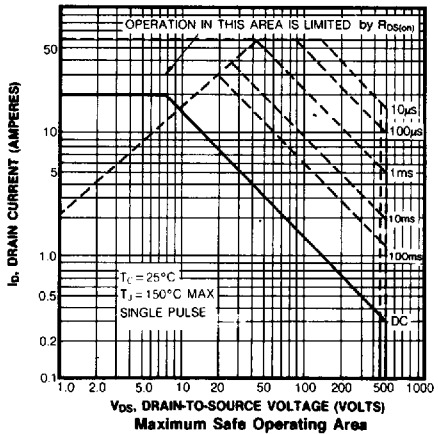
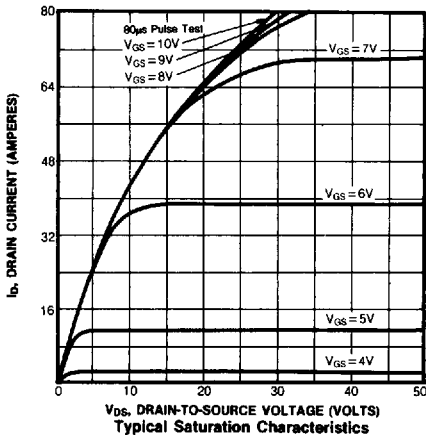
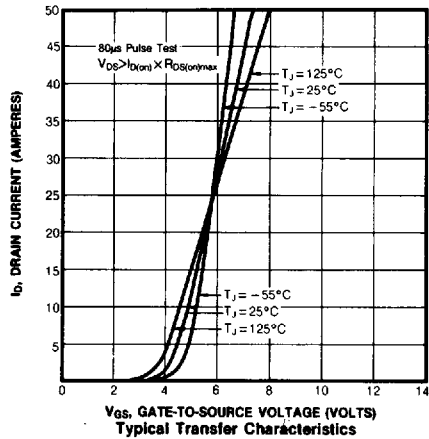
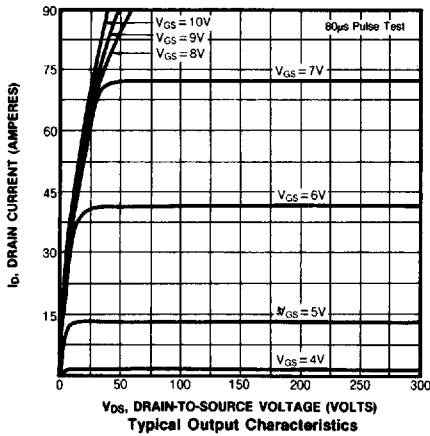
SSH20N50/45

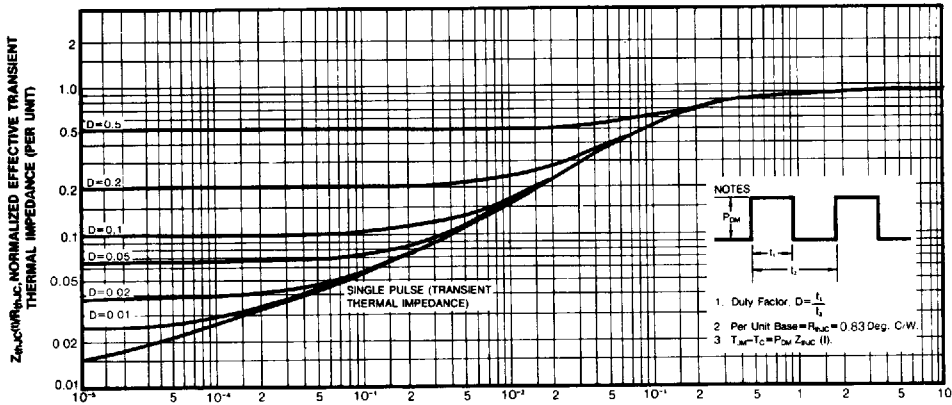
N-CHANNEL POWER MOSFETS

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

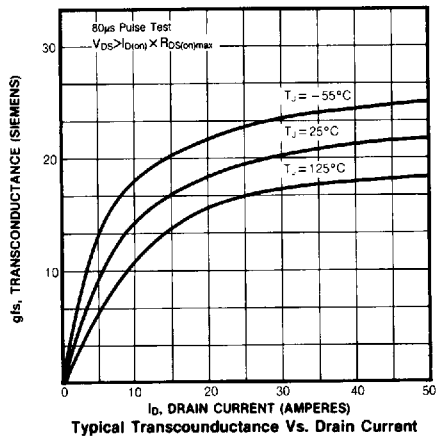
| Symbol | Characteristic | Min | Typ | Max | Units | Test Conditions |
|----------|---|-----|-----|-----|-------|---|
| I_S | Continuous Source Current (Body Diode) | - | - | 20 | A | Modified MOSFET symbol showing the integral reverse P-N junction rectifier  |
| I_{SM} | Pulse Source Current (Body 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°C
 (2) Pulse test : Pulse width $< 300\mu\text{s}$, Duty Cycle $< 2\%$
 (3) Repetitive rating : Pulse width limited by junction temperature

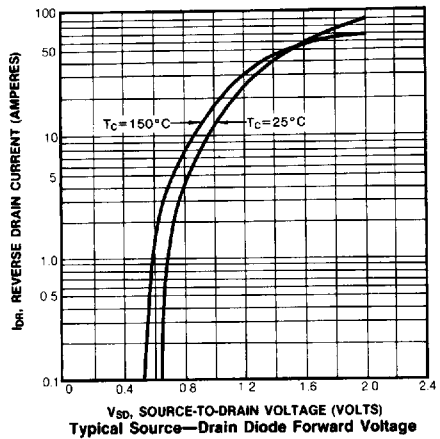




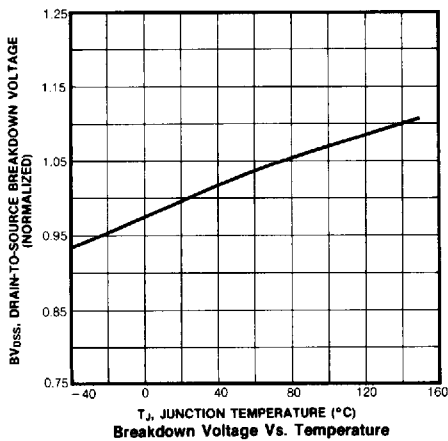
11. SQUARE WAVE PULSE DURATION (SECONDS)
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



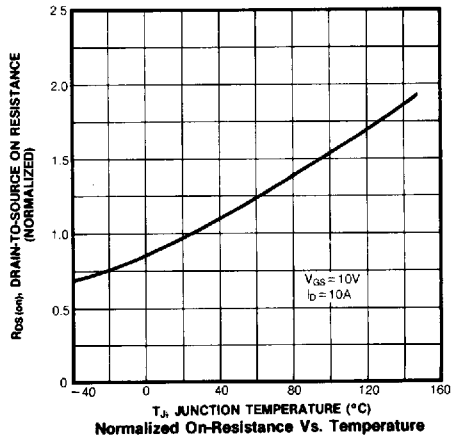
Typical Transconductance Vs. Drain Current



Typical Source-Drain Diode Forward Voltage



Breakdown Voltage Vs. Temperature



Normalized On-Resistance Vs. Temperature

SSH20N50/45

N-CHANNEL POWER MOSFETS

