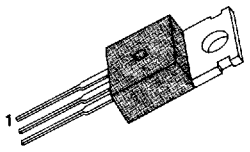
## FEATURES

- 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-220



1. Gate 2. Drain 3. Source

## PRODUCT SUMMARY

| Part Number | $V_{DS}$ | $R_{DS(on)}$ | $I_D$ |
|---|---|---|---|
| SSP6N60 | 600V | 1.8Ω | 6A |
| SSP6N55 | 550V | 1.8Ω | 6A |

## ABSOLUTE MAXIMUM RATINGS

| Characteristic | Symbol | SSP6N60 | SSP6N55 | Unit |
|---|---|---|---|---|
| Drain-Source Voltage (1) | $V_{DSS}$ | 600 | 550 | Vdc |
| Drain-Gate Voltage ($R_{GS}$=1.0MΩ)(1) | $V_{DGR}$ | 600 | 550 | Vdc |
| Gate-Source Voltage | $V_{GS}$ | ±20 | | Vdc |
| Continuous Drain Current $T_C$=25 °C | $I_D$ | 6.0 | | Adc |
| Continuous Drain Current $T_C$=100 °C | $I_D$ | 4.0 | | Adc |
| Drain Current - Pulsed (3) | $I_{DM}$ | 24 | | Adc |
| Gate Current - Pulsed | $I_{GM}$ | ±1.5 | | Adc |
| Single Pulsed Avalanche Energy (4) | $E_{AS}$ | 570 | | mJ |
| Avalanche Current | $I_{AS}$ | 6.0 | | A |
| Total Power Dissipation at $T_C$=25 °C<br>Derate above 25 °C | $P_D$ | 125<br>1.0 | | Watts<br>W/ °C |
| Operating and Storage<br>Junction Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | | °C |
| Maximum Lead Temp. for Soldering<br>Purposes, 1/8" from case for 5 seconds | $T_L$ | 300 | | °C |

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 max. junction temperature
(4) L=27mH, $V_{dd}$=50V, $R_G$=25Ω , Starting $T_J$=25°C

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

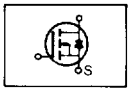
| Symbol | Characteristic | Min | Typ | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|
| | Drain-Source Breakdown Voltage | | | | | |
| BVDSS | SSP6N60 | 600 | - | - | V | VGS=0V, ID=250μA |
| | SSP6N55 | 550 | - | - | V | |
| VGS(th) | Gate Threshold Voltage | 2.0 | - | 4.0 | V | VDS=VGS, ID=250μA |
| IGSS | Gate-Source Leakage Forward | - | - | 100 | nA | VGS=20V |
| IGSS | Gate-Source Leakage Reverse | - | - | -100 | nA | VGS=-20V |
| IDSS | Zero Gate Voltage Drain Current | - | - | 250 | μA | VDS=Max. Rating, VGS=0V |
| | | - | - | 1000 | μA | VDS=0.8 Max. Rating, VGS=0V, Tc=125°C |
| ID(on) | On-State Drain-Source Curredntt(2) | 6.0 | - | - | A | VDS≥10V, ID=10V |
| RDS(on) | Static Drain-Source On | - | - | 1.8 | Ω | VGS=10V, ID=3.0A |
| | Resistance(4) | | | 1.2 | Ω | VGS=10V, ID=3.0A |
| gfs | Forward Transconductance (2) | 3.0 | 4.8 | - | ℧ | VDS≥50V, ID=3.0A |
| Ciss | Input Capacitance | - | 1800 | - | pF | |
| Coss | Output Capacitance | - | 350 | - | pF | VGS=0V, VDS=25V, f=1.0MHz |
| Crss | Reverse Transfer Capacitance | - | 150 | - | pF | |
| td(on) | Turn-On Delay Time | - | 30 | - | ns | VDD=0.5 BVDSS, ID=6.0A, ZO=9.1Ω |
| tr | Rise Time | - | 75 | - | ns | (MOSFET switching times are essentially |
| td(off) | Turn-Off Delay Time | - | 100 | - | ns | independent of operating temperature) |
| tf | Fall Time | - | 60 | - | ns | |
| Qg | Total Gate Charge | - | - | 77 | nC | VGS=10V, ID=6.0A, VDS=0.8 Max. Rating |
| | (Gate-Source Plus Gate-Drain) | | | | | (Gate charge is essentially independent of |
| Qgs | Gate-Source Charge | - | 9.3 | - | nC | operating temperature) |
| Qgd | Gate-Drain ("Miller") Charge | - | 29.3 | - | nC | |

## THERMAL RESISTANCE

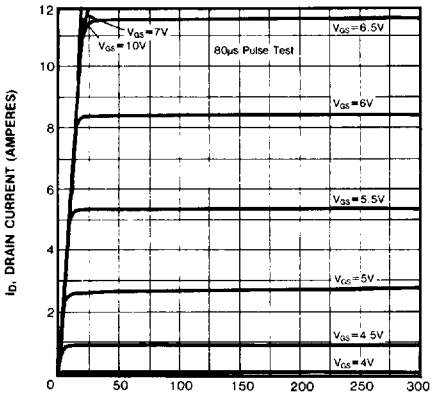
| Symbol | Characteristics | | All | Units | Remark |
|---|---|---|---|---|---|
| RthJC | Junction-to-Case | MAX | 1.0 | K/W | |
| RthCS | Case-to-Sink | TYP | 0.5 | K/W | Mounting surface flat smooth, and greased |
| RthJA | Junction-to-Ambient | MAX | 62.5 | K/W | Free Air Operation |

Notes : (1) TJ=25°C to 150°C
(2) Pulse test : Pulse width≤300μs, Duty Cycle≤2%
(3) Repetitive rating : Pulse width limited by max. junction temperature
(4) For Ultra low "A" RDS(on), device add "A" suffix to part number

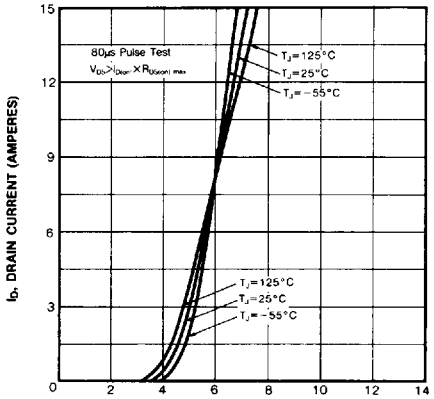
## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol | Characteristic | Min | Typ | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | - | - | 6.0 | A | Modified MOSFET symbol showing the integral reverse P-N junction rectifier  |
| $I_{SM}$ | Pulse Source Current (Body Diode) (3) | - | - | 24.0 | A | |
| $V_{SD}$ | Diode Forward Voltage (2) | - | - | 1.5 | V | $T_J$=25°C, $I_S$=10.0A, $V_{GS}$=0V |
| $t_{rr}$ | Reverse Recovery Time | - | 450 | 940 | ns | $T_J$=25°C, $I_F$=10.0A, $dI_F/dt$=100A/μS |

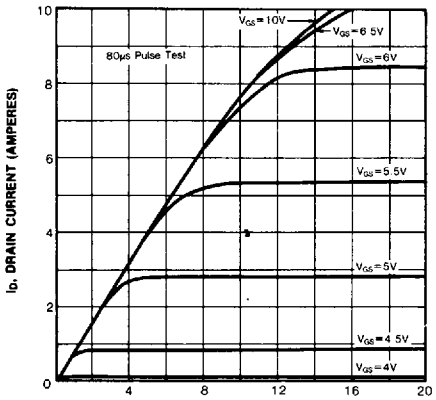
Notes : (1) $T_J$=25°C to150°C
(2) Pulse test : Pulse width ≤ 300μs, Duty Cycle ≤ 2%
(3) Repetitive rating : Pulse width limited by max. junction temperature



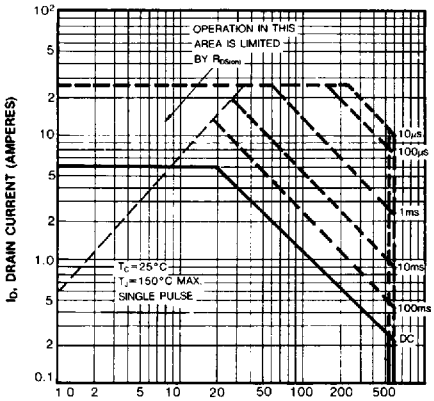
Typical Output Characteristics



Typical Transfer Characteristics



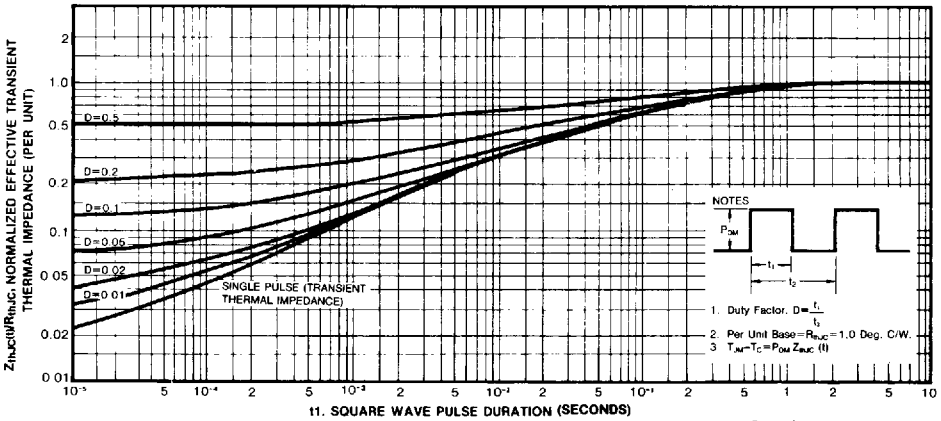
Typical Saturation Characteristics



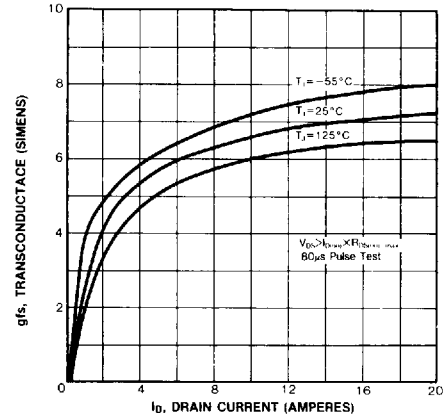
Maximum Safe Operating Area



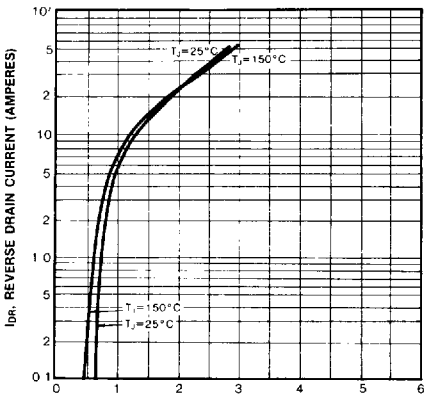
SAMSUNG ELECTRONICS



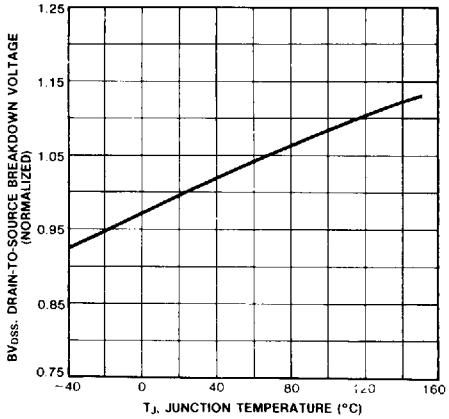

Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



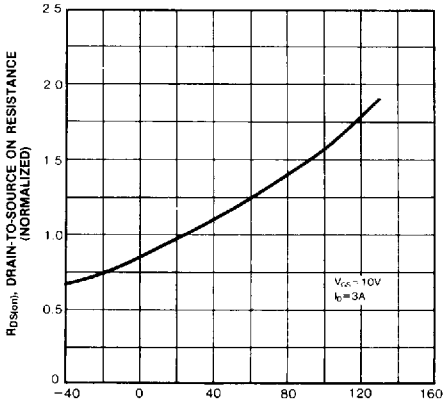

Typical Transconductance Vs. Drain Current



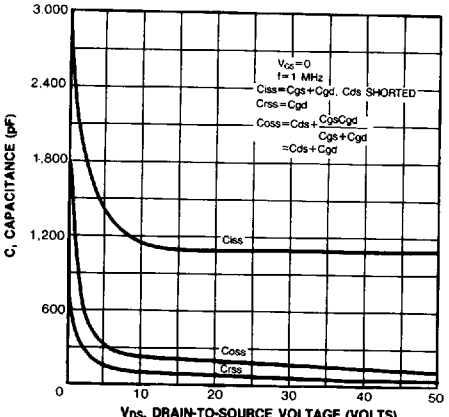

Typical Source—Drain Diode Forward Voltage



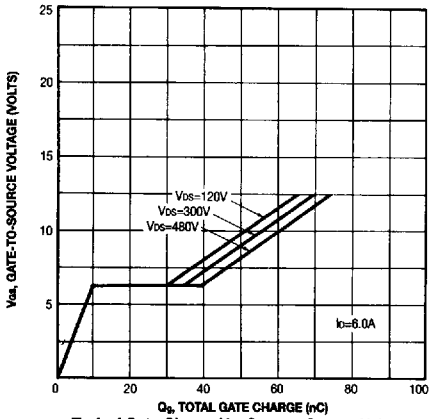

Breakdown Voltage Vs. Temperature



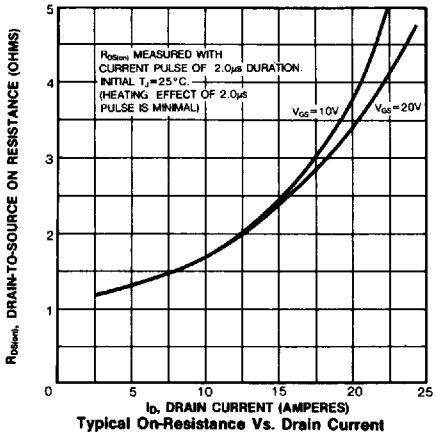

Normalized On-Resistance Vs. Temperature



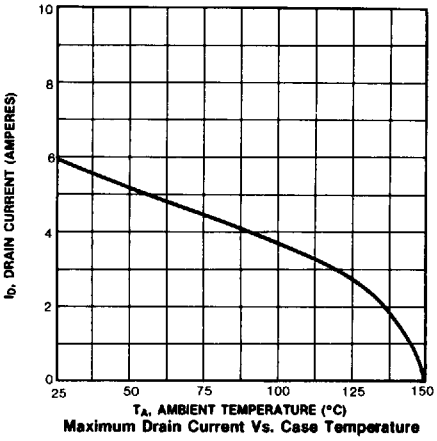

Typical Capacitance Vs. Drain to Source Voltage



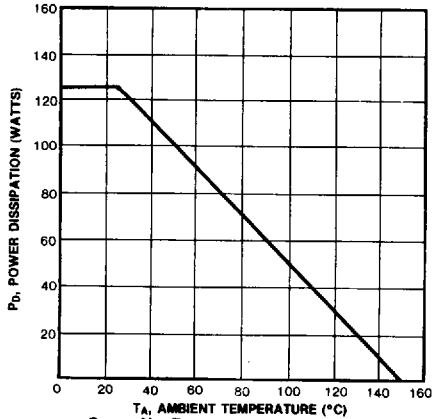

Typical Gate Charge Vs. Gate-to-Source Voltage




Typical On-Resistance Vs. Drain Current




Maximum Drain Current Vs. Case Temperature




Power Vs. Temperature Derating Curve