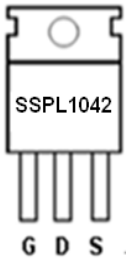
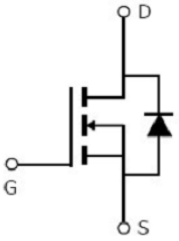
## Main Product Characteristics:

| | |
|---|---|
| $V_{DSS}$ | 100V |
| $R_{DS}$(on) | 33mohm(typ.) |
| $I_D$ | 33A ① |

TO220




Marking and pin Assignment




Schematic diagram

## Features and Benefits:

- Advanced Process Technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 175℃ operating temperature

## Description:

These N-Channel enhancement mode power field effect transistors are produced using silikron proprietary MOSFET technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switch mode power supplies.

## Absolute max Rating:

| Symbol | Parameter | Max. | Units |
|---|---|---|---|
| $I_D$ @ TC = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V | 33 ① | A |
| $I_D$ @ TC = 100°C | Continuous Drain Current, $V_{GS}$ @ 10V | 23 ① | |
| $I_{DM}$ | Pulsed Drain Current ② | 132 | |
| $P_D$ @TC = 25°C | Power Dissipation ③ | 127 | W |
| | Linear Derating Factor | 0.85 | W/°C |
| $V_{DS}$ | Drain-Source Voltage | 100 | V |
| $V_{GS}$ | Gate-to-Source Voltage | ± 20 | V |
| $E_{AS}$ | Single Pulse Avalanche Energy @ L=0.6mH | 235 | mJ |
| $I_{AS}$ | Avalanche Current @ L=0.6mH | 28 | A |
| $T_J$ $T_{STG}$ | Operating Junction and Storage Temperature Range | -55 to +175 | °C |

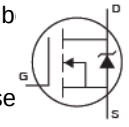
## Thermal Resistance

| Symbol | Characterizes | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-case ③ | — | 1.18 | °C/W |
| $R_{\theta JA}$ | Junction-to-ambient (t ≤ 10s) ④ | — | 62 | °C/W |
| | Junction-to-Ambient (PCB mounted, steady-state) ④ | — | 40 | °C/W |

## Electrical Characterizes @$T_A$=25℃ unless otherwise specified

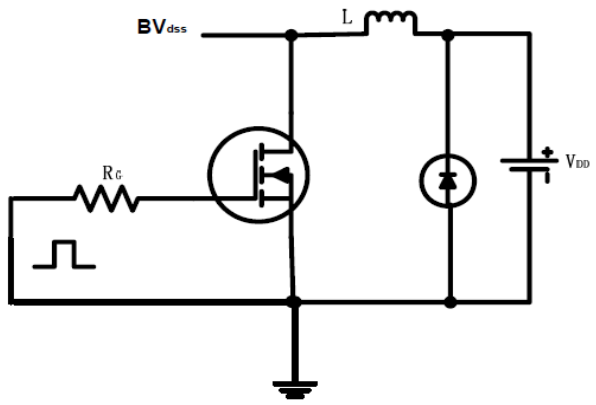
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source breakdown voltage | 100 | — | — | V | $V_{GS}$ = 0V, $I_D$= 250μA |
| $R_{DS(on)}$ | Static Drain-to-Source on-resistance | — | 33 | 37 | mΩ | $V_{GS}$=10V,$I_D$ =16.5A |
| | | — | 68.8 | — | | $T_J$ = 125°C |
| $V_{GS(th)}$ | Gate threshold voltage | 2 | — | 4 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| | | — | 2.39 | — | | $T_J$ = 125°C |
| $I_{DSS}$ | Drain-to-Source leakage current | — | — | 1 | μA | $V_{DS}$ =100V,$V_{GS}$ = 0V |
| | | — | — | 50 | | $T_J$ = 125°C |
| $I_{GSS}$ | Gate-to-Source forward leakage | — | — | 100 | nA | $V_{GS}$ =20V |
| | | -100 | — | — | | $V_{GS}$ = -20V |
| $Q_g$ | Total gate charge | — | 26.9 | — | nC | $I_D$ = 33A, |
| $Q_{gs}$ | Gate-to-Source charge | — | 8.2 | — | | $V_{DS}$=80V, |
| $Q_{gd}$ | Gate-to-Drain("Miller") charge | — | 10.2 | — | | $V_{GS}$ = 10V |
| $t_{d(on)}$ | Turn-on delay time | — | 29.1 | — | nS | $V_{GS}$=10V, $V_{DD}$ =50V, |
| $t_r$ | Rise time | — | 133.1 | — | | $R_L$=1.5Ω, |
| $t_{d(off)}$ | Turn-Off delay time | — | 103.0 | — | | $R_{GEN}$=25Ω |
| $t_f$ | Fall time | — | 89.6 | — | | $I_D$ =33A |
| $C_{iss}$ | Input capacitance | — | 1828 | — | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output capacitance | — | 182 | — | | $V_{DS}$ = 25V |
| $C_{rss}$ | Reverse transfer capacitance | — | 25 | — | | $f$ = 1MHz |

## Source-Drain Ratings and Characteristics

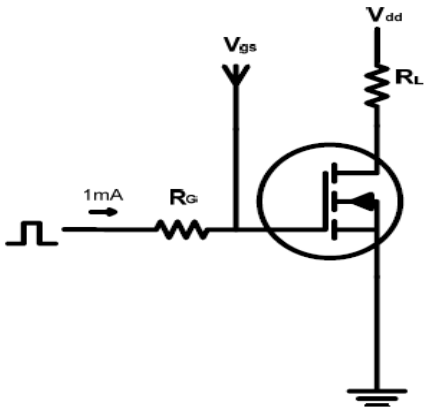
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | 33 ① | A | MOSFET symb showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) | — | — | 132 ① | A | |
| $V_{sd}$ | Diode Forward Voltage | — | 0.91 | 1.3 | V | $I_S$=33A, $V_{GS}$=0V, $T_J$ = 25°C |
| $t_{rr}$ | Reverse Recovery Time | — | 44.8 | — | nS | $T_J$ = 25°C, $I_F$ =33A, di/dt = 100A/μs |
| $Q_{rr}$ | Reverse Recovery Charge | — | 101.3 | — | nC | |

## Test circuits and Waveforms

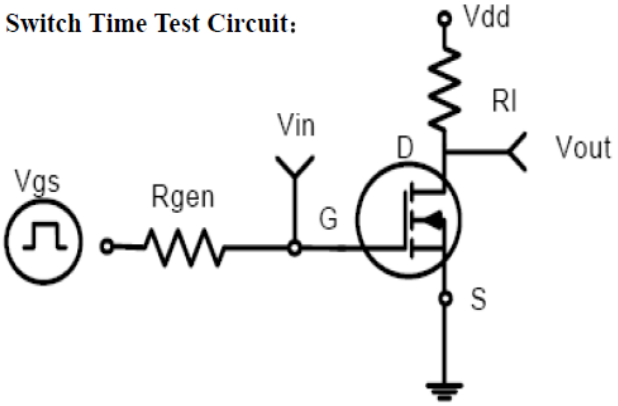
**EAS test circuits:**



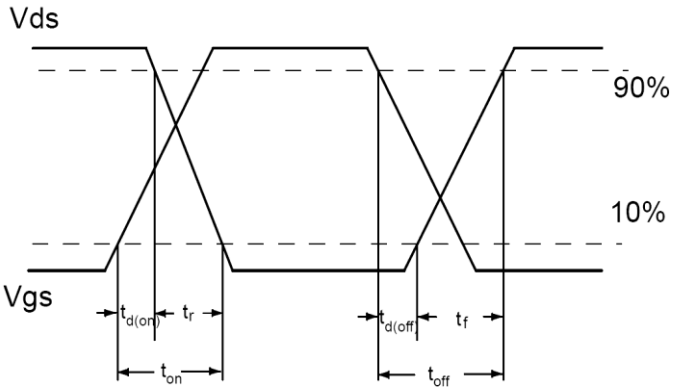

**Gate charge test circuit:**




**Switch Time Test Circuit:**




**Switch Waveforms:**




## Notes:

①Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

②Repetitive rating; pulse width limited by max. junction temperature.

③The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.

④The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C

⑤These curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=175°C.

## Typical electrical and thermal characteristics

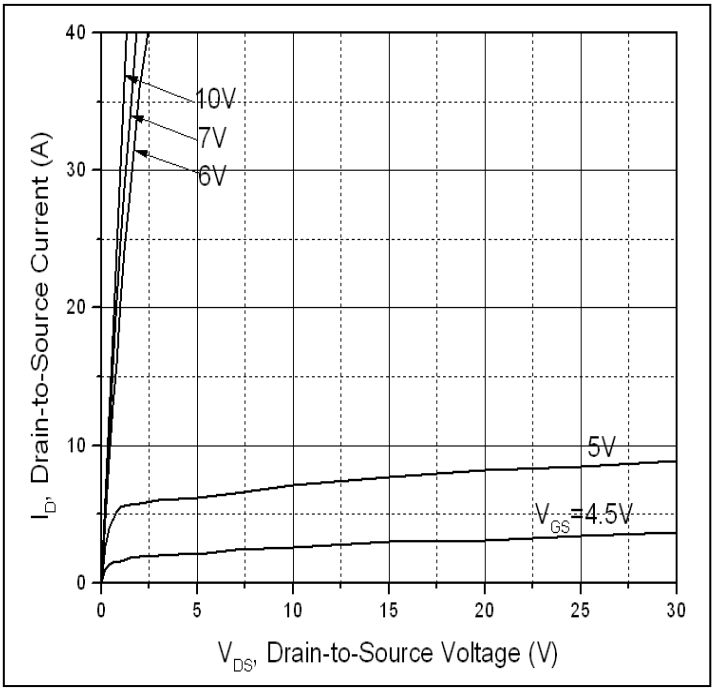



**Figure 1: Typical Output Characteristics**

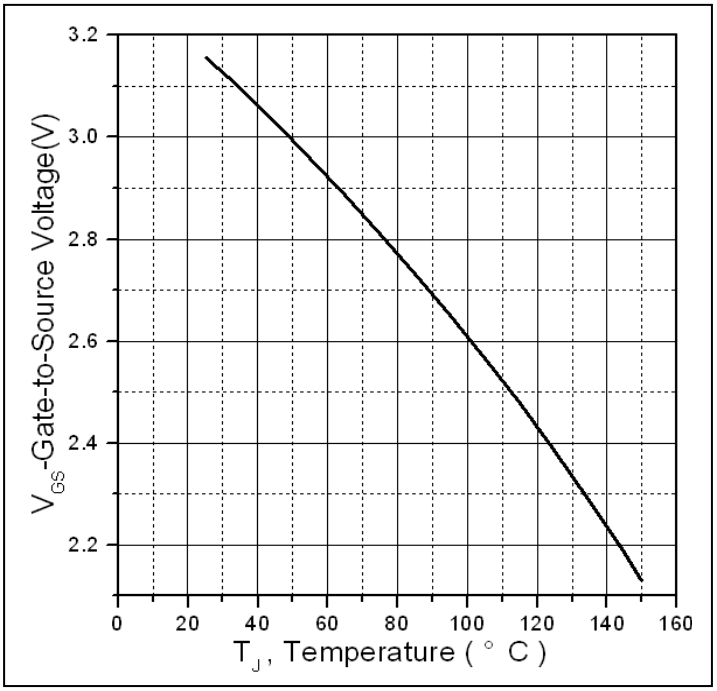



**Figure 2. Gate to source cut-off voltage**

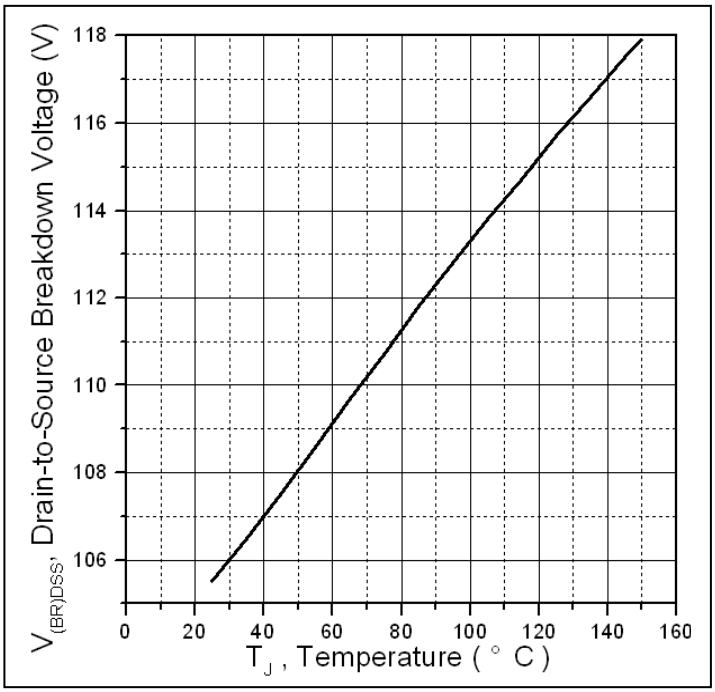



**Figure 3. Drain-to-Source Breakdown Voltage vs. Temperature**

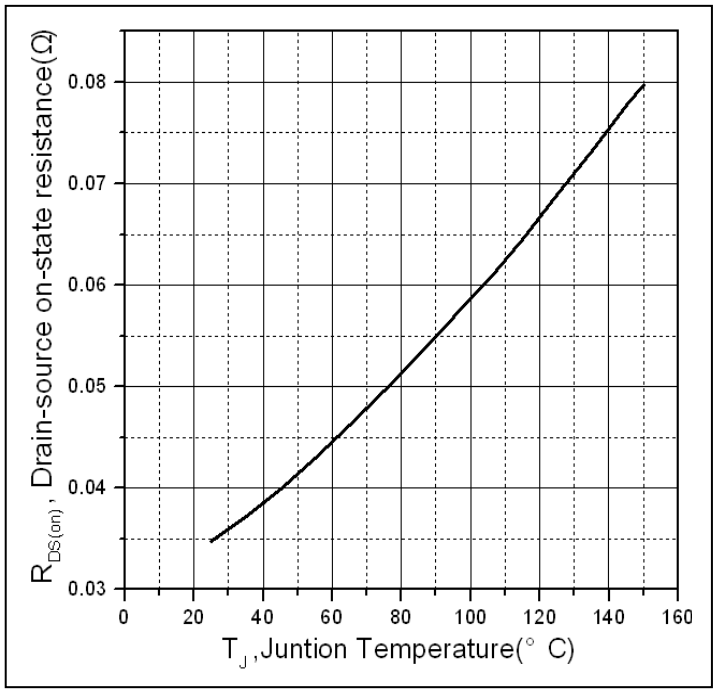



**Figure 4: Normalized On-Resistance Vs. Case Temperature**

## Typical electrical and thermal characteristics

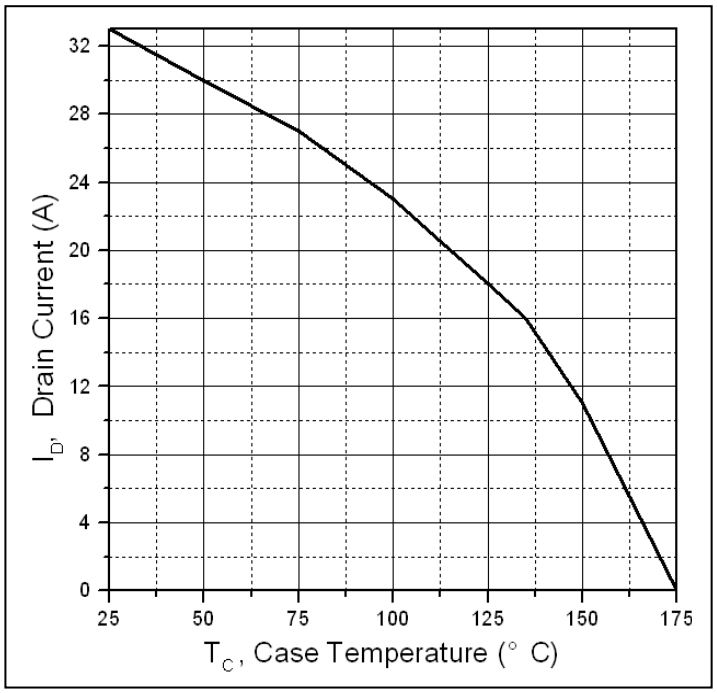



Figure 5. Maximum Drain Current Vs. Case Temperature

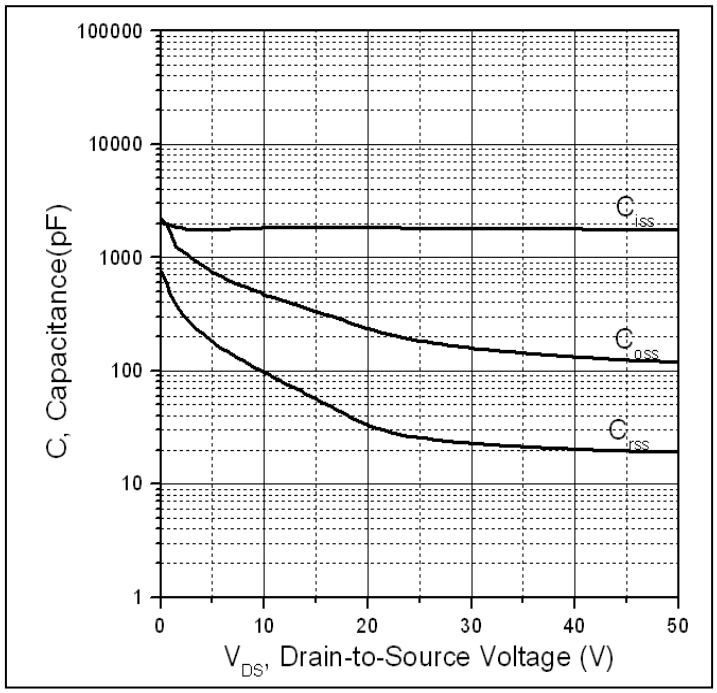



Figure 6.Typical Capacitance Vs. Drain-to-Source Voltage

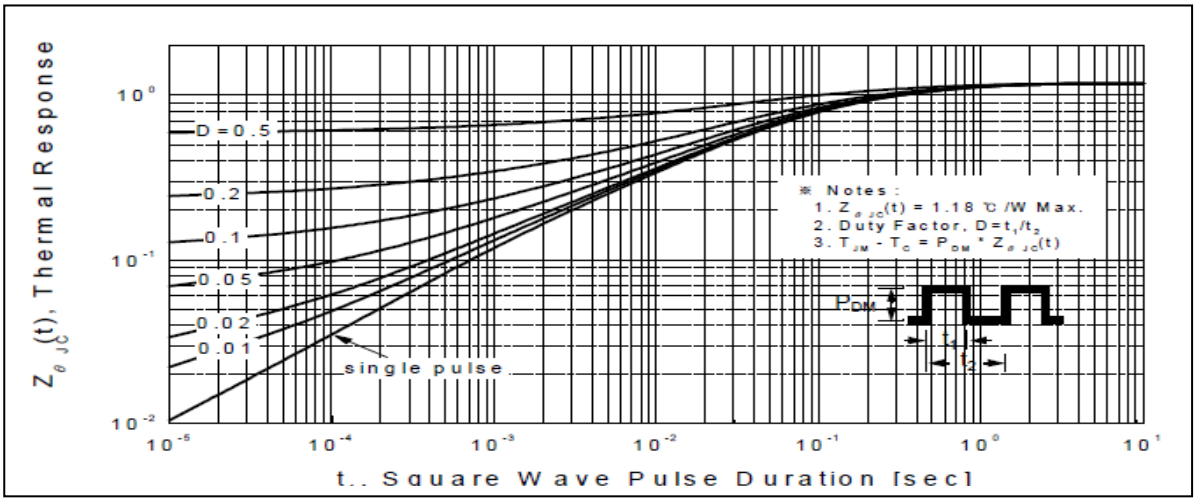
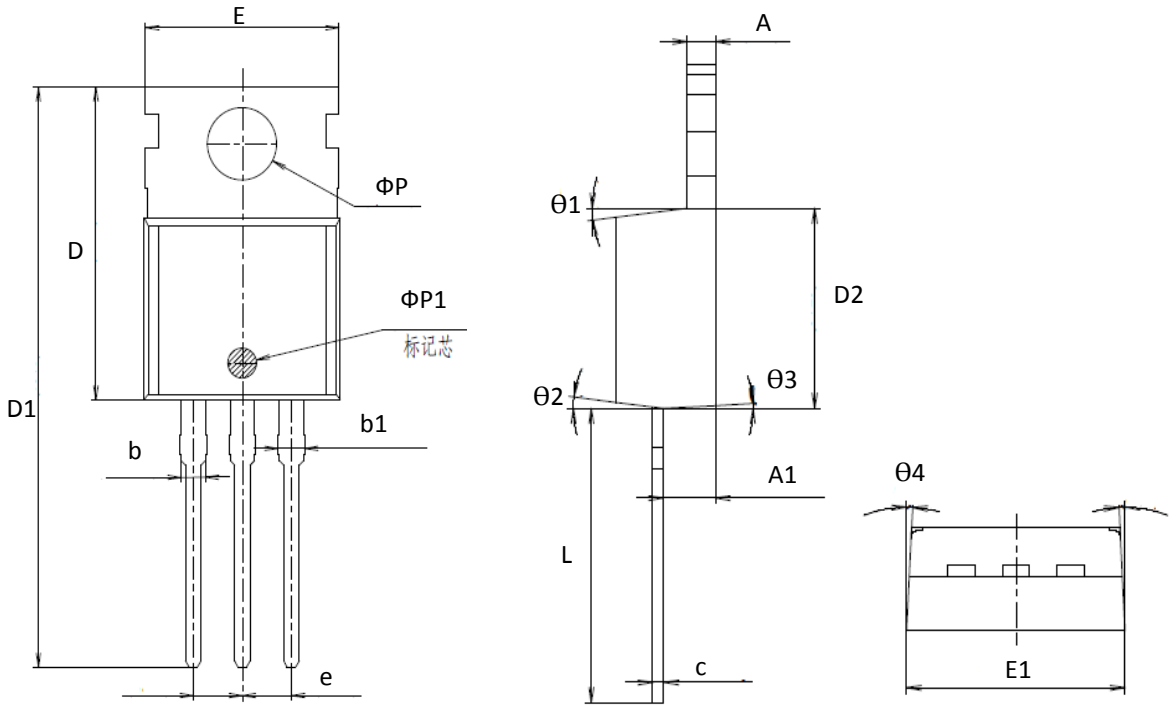



Figure7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

## Mechanical Data

**TO220 PACKAGE OUTLINE DIMENSION_GN**




| Symbol | Dimension In Millimeters | | | Dimension In Inches | | |
|---|---|---|---|---|---|---|
| | Min | Nom | Max | Min | Nom | Max |
| A | - | 1.300 | - | - | 0.051 | - |
| A1 | 2.200 | 2.400 | 2.600 | 0.087 | 0.094 | 0.102 |
| b | - | 1.270 | - | - | 0.050 | - |
| b1 | 1.270 | 1.370 | 1.470 | 0.050 | 0.054 | 0.058 |
| c | - | 0.500 | - | - | 0.020 | - |
| D | - | 15.600 | - | - | 0.614 | - |
| D1 | - | 28.700 | - | - | 1.130 | - |
| D2 | - | 9.150 | - | - | 0.360 | - |
| E | 9.900 | 10.000 | 10.100 | 0.390 | 0.394 | 0.398 |
| E1 | - | 10.160 | - | - | 0.400 | - |
| ΦP | - | 3.600 | - | - | 0.142 | - |
| ΦP1 | | 1.500 | | 0.059 | | |
| e | 2.54BSC | | | 0.1BSC | | |
| L | 12.900 | 13.100 | 13.300 | 0.508 | 0.516 | 0.524 |
| θ1 | - | $7^0$ | - | - | $7^0$ | - |
| θ2 | - | $7^0$ | - | - | $7^0$ | - |
| θ3 | - | $3^0$ | - | $5^0$ | $7^0$ | $9^0$ |
| θ4 | - | $3^0$ | - | $1^0$ | $3^0$ | $5^0$ |

## Ordering and Marking Information

**Device Marking: SSPL1042**

**Package (Available)**

**TO220**

**Operating Temperature Range**

**C : -55 to175 ºC**

## Devices per Unit

| Package Type | Units/ Tube | Tubes/Inner Box | Units/Inner Box | Inner Boxes/Carton Box | Units/Carton Box |
|---|---|---|---|---|---|
| TO220 | 50 | 20 | 1000 | 6 | 6000 |

## Reliability Test Program

| Test Item | Conditions | Duration | Sample Size |
|---|---|---|---|
| High Temperature Reverse Bias(HTRB) | $T_j$=125℃ to 175℃ @ 80% of Max $V_{DSS}$/$V_{CES}$/VR | 168 hours<br>500 hours<br>1000 hours | 3 lots x 77 devices |
| High Temperature Gate Bias(HTGB) | $T_j$=125℃ or 175℃ @ 100% of Max $V_{GSS}$ | 168 hours<br>500 hours<br>1000 hours | 3 lots x 77 devices |

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