

Absolute Maximum Ratings

| Symbol | Parameter | Rating | Unit | |
|--------------------------------------------------------|--------------------------------------------|------------|-------|------|
| Common Ratings (Tc=25°C Unless Otherwise Noted) | | | | |
| V _{DSS} | Drain-Source Voltage | 100 | V | |
| V _{GSS} | Gate-Source Voltage | f 20 | V | |
| T _J | Junction Temperature Range | -55 to 175 | °C | |
| T _{STG} | Storage Temperature Range | | °C | |
| I _S | Source Current-Continuous(Body Diode) | Tc=25°C | 120 | A |
| Mounted on Large Heat Sink | | | | |
| I _{DM} | Pulsed Drain Current * | Tc=25°C | 360 | A |
| I _D | Continuous Drain Current | Tc=25°C | 120 | A |
| | | Tc=100°C | 81.3 | A |
| P _D | Maximum Power Dissipation | Tc=25°C | 164.8 | W |
| | | Tc=100°C | 82.4 | W |
| R _{θC} | Thermal Resistance, Junction-to-Case | | 0.91 | °C/W |
| R _{θA} | Thermal Resistance, Junction-to-Ambient ** | | 75 | °C/W |
| E _{AS} | Single Pulsed-Avalanche Energy *** | L=0.3mH | 420 | mJ |

Note: * Repetitive rating pulse width limited by max.junction temperature.
 ** Surface mounted on 1in2 FR-4 board.
 *** Limited by T_{Jmax} , starting T_J=25°C, L = 0.3mH, R_θ= 25 , V_{GS} =10V.

Electrical Characteristics(Tc =25°C Unless Otherwise Noted)

| Symbol | Parameter | Test Conditions | HYG053N10NS2 | | | Unit |
|-------------------------------|----------------------------------|-----------------------------------------------------------|--------------|------|------|------|
| | | | Min | Typ. | Max | |
| Static Characteristics | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _{DS} =250 A | 100 | - | - | V |
| I _{DSS} | Drain-to-Source Leakage Current | V _{DS} =100V, V _{GS} =0V | - | - | 1 | A |
| | | T _J =125°C | - | - | 50 | A |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _{DS} =250 A | 2.2 | 3 | 3.8 | V |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} = f 20V, V _{DS} =0V | - | - | ±100 | nA |
| R _{DS(ON)} | Drain-Source On-State Resistance | V _{GS} =10V, I _{DS} =20A | - | 4.5 | 5.5 | m |
| Diode Characteristics | | | | | | |

V_{SD} Diode Fo15.8-0.0022 Tc69.384 1104.6f

Electrical Characteristics (Cont.) (Tc =25°C Unless Otherwise Noted)

| Symbol | Parameter | Test Conditions | HYG053N10NS2 | | | Unit |
|------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------|--------------|------|-----|------|
| | | | Min | Typ. | Max | |
| Dynamic Characteristics | | | | | | |
| R _G | Gate Resistance | V _{GS} =0V, V _{DS} =0V, F=500kHz | - | 0.7 | - | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} = 25V, Frequency=500kHz | - | 6512 | - | pF |
| C _{oss} | Output Capacitance | | | | | |
| C _{rss} | Reverse Transfer Capacitance | | | | | |
| t _{d(ON)} | Turn-on Delay Time | V _{DD} =50V, R _G =2.5 I _{DS} =20A, V _{GS} =10V | - | 27 | - | ns |
| T _r | Turn-on Rise Time | | | | | |
| t _{d(OFF)} | Turn-off Delay Time | | | | | |
| T _f | Turn-off Fall Time | | | | | |
| Gate Charge Characteristics | | | | | | |
| Q _g | Total Gate Charge(V _{GS} =10V) | V _{DS} =80V, I _{DS} =20A | - | 92 | - | nC |
| Q _{gs} | Gate-Source Charge | | | | | |
| Q _{gd} | Gate-Drain Charge | | | | | |
| V _{plateau} | Gate plateau voltage | | - | 5.3 | - | V |

Note: *Pulse test ** pulse width 300us ** duty cycle 2%

Typical Operating Characteristics

Figure 1: Power Dissipation

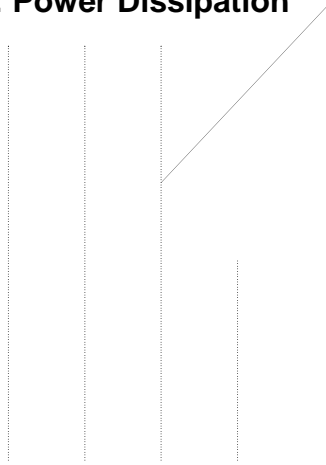


Figure 2: Drain Current

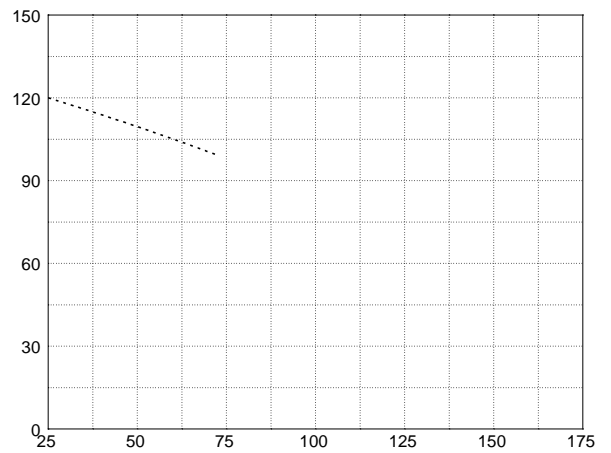


Figure 3: Safe Operation Area

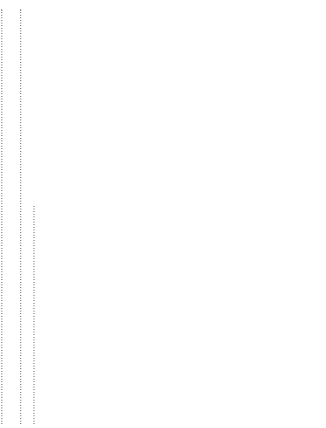


Figure 4: Thermal Transient Impedance

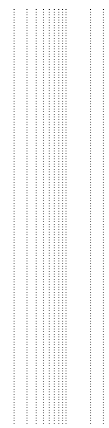


Figure 5: Output Characteristics

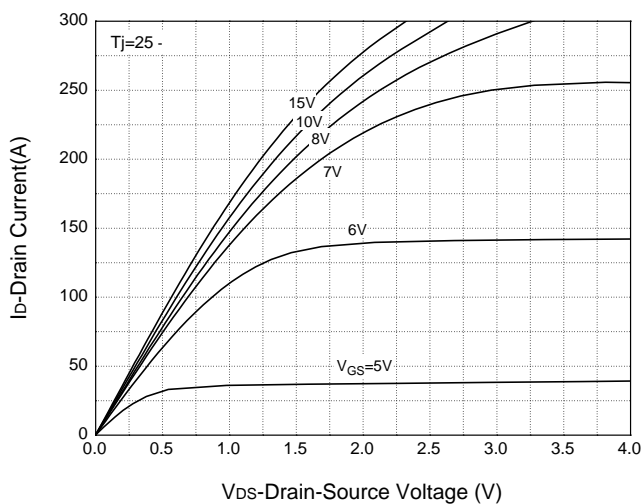
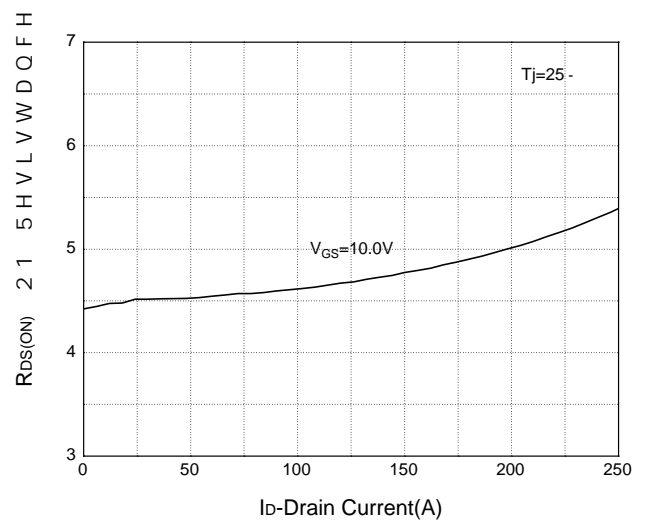


Figure 6: Drain-Source On Resistance



Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

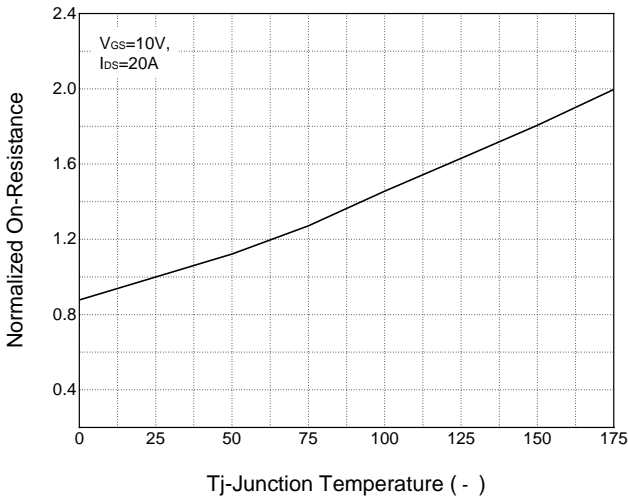


Figure 8: Source-Drain Diode Forward

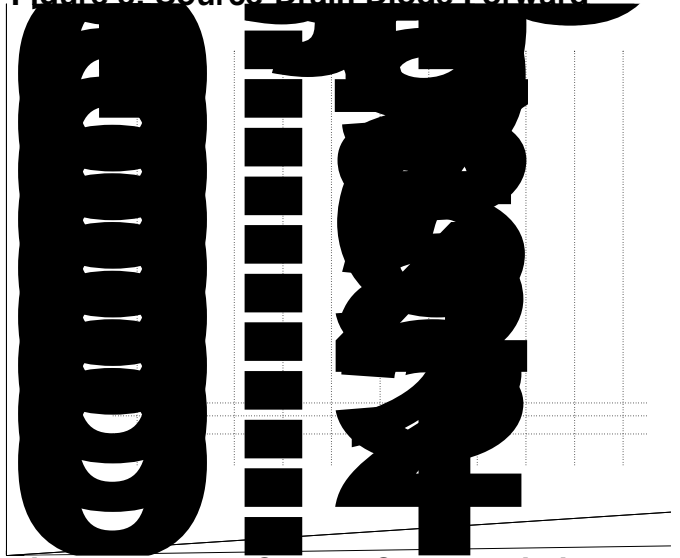


Figure 9: Capacitance Characteristics

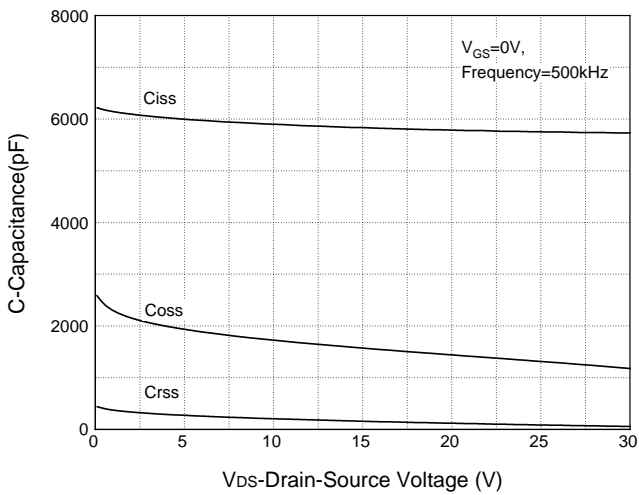
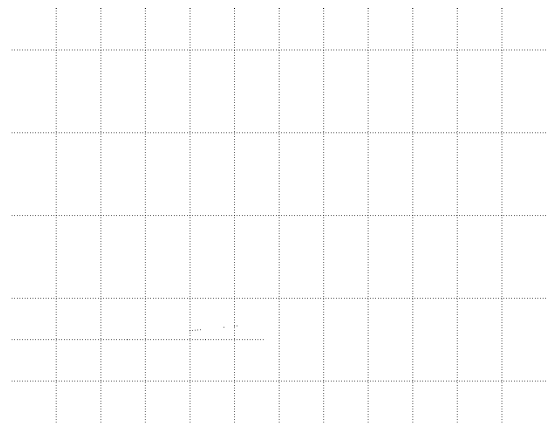
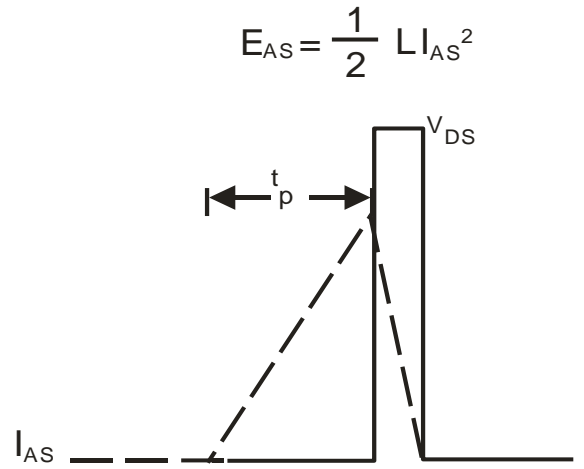
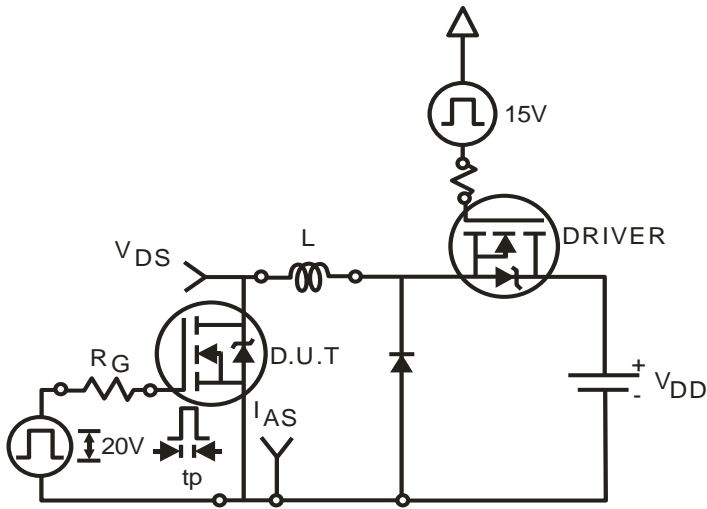


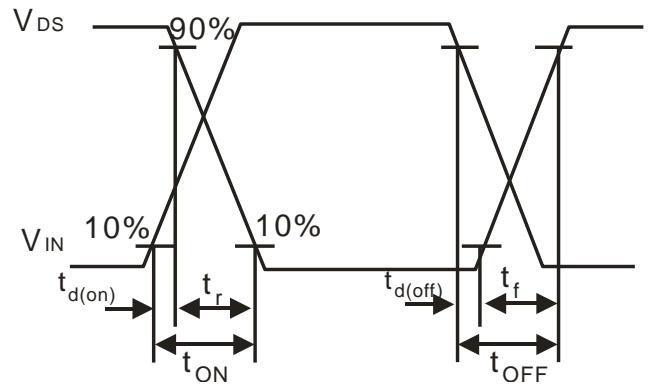
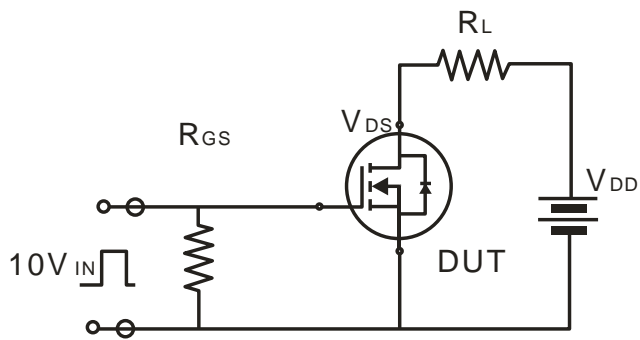
Figure 10: Gate Charge Characteristics



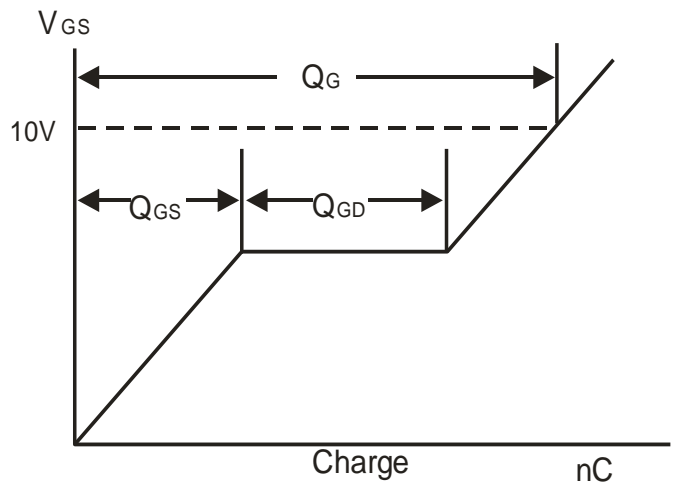
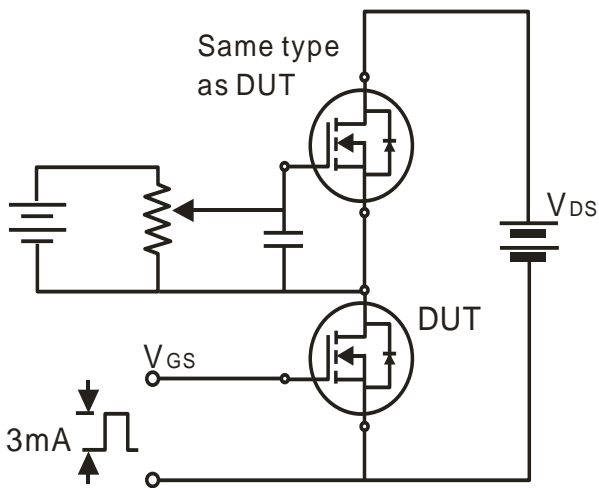
Avalanche Test Circuit



Switching Time Test Circuit



Gate Charge Test Circuit



Device Per Unit

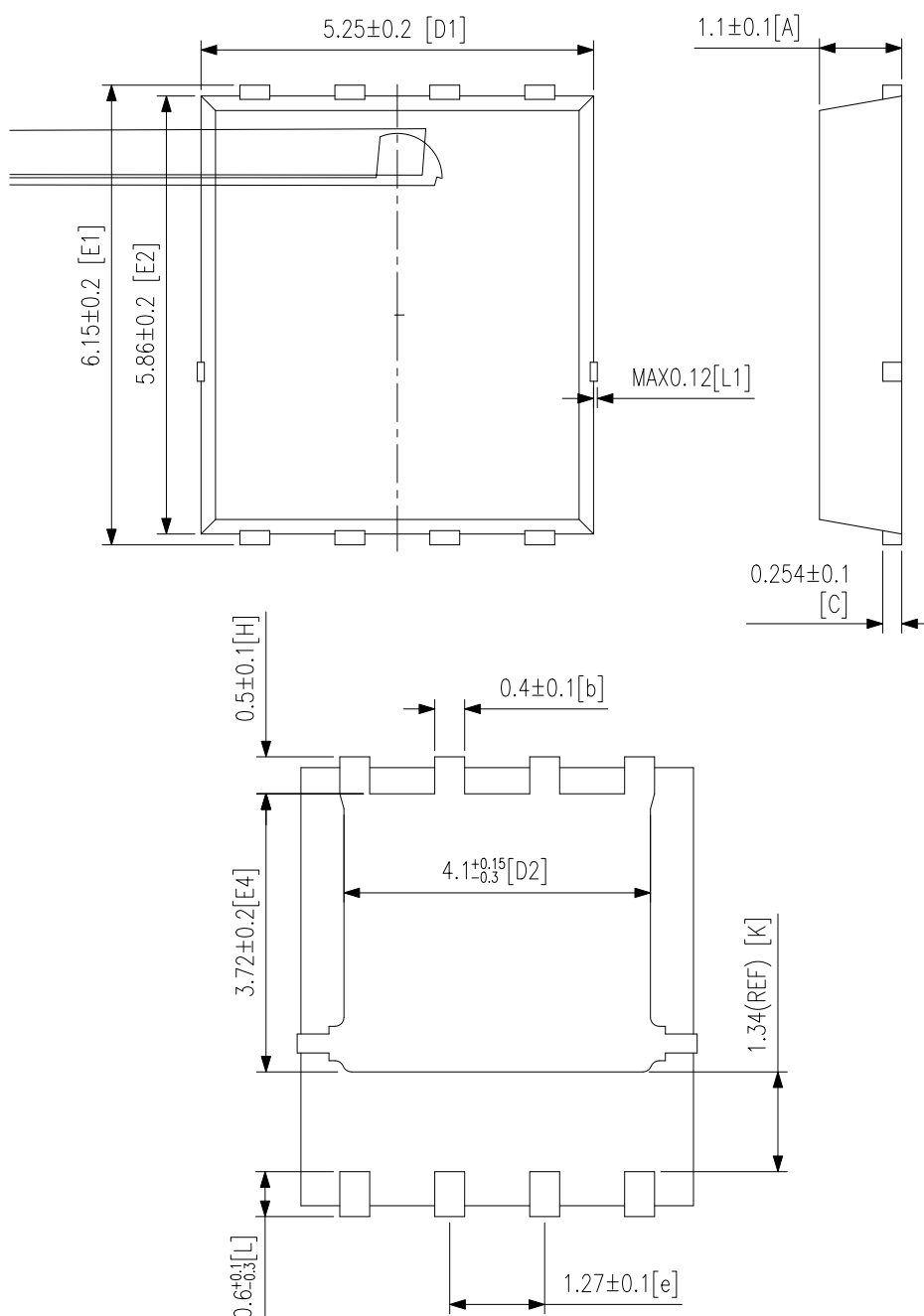
Device Per Unit

| Package Type | Unit | Quantity |
|--------------|------|----------|
| PDFN8L(5x6) | Reel | 5000 |

Package Information

PDFN8L(5x6)

(unit:mm)



Classification Profile

Classification Reflow Profiles

| Profile Feature | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|------------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------------------|
| Preheat & Soak | | |
| Temperature min (T_{smin}) | 100 °C | 150 °C |
| Temperature max (T_{smax}) | 150 °C | 200 °C |
| Time (T_{smin} to T_{smax}) (t_s) | 60-120 seconds | 60-120 seconds |
| Average ramp-up rate (T_{smax} to T_p) | 3 °C/second max. | 3°C/second max. |
| Liquidous temperature (T_L) | 183 °C | 217 °C |
| Time at liquidous (t_l) | 60-150 seconds | 60-150 seconds |
| Peak package body Temperature (T_p)* | See Classification Temp in table 1 | See Classification Temp in table 2 |
| Time (t_p)** within 5°C of the specified classification temperature (T_c) | 20** seconds | 30** seconds |
| Average ramp-down rate (T_p to T_{smax}) | 6 °C/second max. | 6 °C/second max. |
| Time 25°C to peak temperature | 6 minutes max. | 8 minutes max. |
| *Tolerance for peak profile Temperature (T_p) is defined as a supplier minimum and a user maximum. | | |
| ** Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum. | | |

Table 1.SnPb Eutectic Process –Classification Temperatures (Tc)

| Package Thickness | Volume mm ² <350 | Volume mm ² 1350 |
|-------------------|-----------------------------|-----------------------------|
| ∅2.5 mm | 235 °C | 220 °C |
| P P | 220 °C | 220 °C |

Table 2.Pb-free Process –Classification Temperatures (Tc)

| Package Thickness | Volume mm ² <350 | Volume mm ² 350-2000 | Volume mm ² 12000 |
|-------------------|-----------------------------|---------------------------------|------------------------------|
| <1.6 mm | 260 °C | 260 °C | 260 °C |
| 1.6 mm –2.5 mm | 260 °C | 250 °C | 245 °C |
| 12.5 mm | 250 °C | 245 °C | 245 °C |

Reliability Test Program

| Test item | Method | Description |
|---------------|---------------|--------------------------------------------|
| SOLDERABILITY | JESD-22, B102 | 5 Sec, 245°C |
| HTRB | JESD-22, A108 | 168/500 Hrs, Bias @ 150°C |
| HTGB | JESD-22, A108 | 168 /500 Hrs, V _{gs} 100% @ 150°C |
| PCT | JESD-22, A102 | 96 Hrs, 100%RH, 2atm, 121°C |
| TCT | JESD-22, A104 | 250/500 Cycles, -55°C~150°C |