



N-CHANNEL MOSFET

Qualified per MIL-PRF-19500/555

Qualified Levels:
JAN, JANTX, and
JANTXV

DESCRIPTION

These 2N6788U and 2N6790U devices are military qualified up to a JANTXV level for high-reliability applications. Microsemi also offers numerous other products to meet higher and lower power voltage regulation applications.

Important: For the latest information, visit our website <http://www.microsemi.com>.

FEATURES

- Surface mount equivalent of JEDEC registered 2N6788 and 2N6790 numbers.
- JAN, JANTX, and JANTXV qualifications are available per MIL-PRF-19500/555.
- RoHS compliant by design.

APPLICATIONS / BENEFITS

- High frequency operation.
- Lightweight, low-profile package.
- ESD rated to class 1A.

MAXIMUM RATINGS @ T_C = +25 °C unless otherwise noted

| Parameters / Test Conditions | Symbol | Value | Unit | |
|---|-----------------------------------|--------------------|--------------------|------------|
| Junction & Storage Temperature | T _J , T _{stg} | -55 to +150 | °C | |
| Thermal Resistance Junction-to-Case (see Figure 1) | R _{θJC} | 8.93 | °C/W | |
| Total Power Dissipation ⁽¹⁾ | P _T | 0.8 | W | |
| Drain to Gate Voltage | V _{DG} | 2N6788U 2N6790U | 100 200 | V |
| Drain – Source Voltage | | V _{DS} | 2N6788U 2N6790U | 100 200 |
| Gate – Source Voltage | V _{GS} | | ± 20 | V |
| Drain Current, dc @ T _C = +25 °C ⁽²⁾ (see Figure ?) | I _{D1} | 2N6788U 2N6790U | 4.5 2.8 | A |
| Drain Current, dc @ T _C = +100 °C | | I _{D2} | 2N6788U 2N6790U | 2.8 1.8 |
| Off-State Current ⁽³⁾ | I _{DM} | | 2N6788U 2N6790U | 18 11 |
| Source Current | | I _S | 2N6788U 2N6790U | 4.5 2.8 |

- Notes:**
1. Derated linearly by 0.11 W/°C for T_C > +25 °C.
 2. The following formula derives the maximum theoretical I_D limit. I_D is also limited by package and internal wires and may be limited due to pin diameter.

$$I_D = \sqrt{\frac{T_J(\text{max}) - T_C}{R_{\theta JC} \times R_{DS(\text{on})} @ T_J(\text{max})}}$$

3. I_{DM} = 4 × I_{D1}; I_{D1} as calculated in note 2.



U-18 LCC Package

Also available in:

TO-205AF Package
(leaded)

 [2N6788 & 2N6790](#)

MSC – Lawrence

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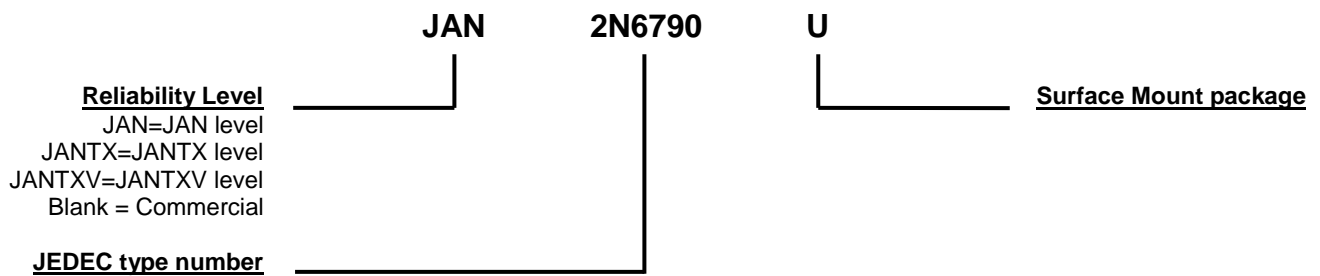
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MECHANICAL and PACKAGING

- CASE: Ceramic LCC-18 with kovar gold plated lid.
- TERMINALS: Gold plating over nickel.
- MARKING: Manufacturer's ID, part number, date code, ESD symbol at pin 1 location.
- TAPE & REEL option: Standard per EIA-481-D. Consult factory for quantities.
- See [Package Dimensions](#) on last page.

PART NOMENCLATURE

SYMBOLS & DEFINITIONS

| Symbol | Definition |
|----------|--------------------------|
| I_D | Drain current. |
| I_F | Forward current. |
| T_C | Case temperature. |
| V_{DD} | Drain supply voltage. |
| V_{DS} | Drain to source voltage. |
| V_{GS} | Gate to source voltage. |

ELECTRICAL CHARACTERISTICS @ $T_A = +25\text{ }^\circ\text{C}$, unless otherwise noted

| Parameters / Test Conditions | Symbol | Min. | Max. | Unit |
|--|---|------------|------------------------|------|
| OFF CHARACTERISTICS | | | | |
| Drain-Source Breakdown Voltage $V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$ | 2N6788U 2N6790U $V_{(BR)DSS}$ | 100 200 | | V |
| Gate-Source Voltage (Threshold) $V_{DS} \geq V_{GS}, I_D = 0.25\text{ mA}$ $V_{DS} \geq V_{GS}, I_D = 0.25\text{ mA}, T_j = +125\text{ }^\circ\text{C}$ $V_{DS} \geq V_{GS}, I_D = 0.25\text{ mA}, T_j = -55\text{ }^\circ\text{C}$ | $V_{GS(th)1}$ $V_{GS(th)2}$ $V_{GS(th)3}$ | 2.0 1.0 | 4.0 5.0 | V |
| Gate Current $V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$ $V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}, T_j = +125\text{ }^\circ\text{C}$ | I_{GSS1} I_{GSS2} | | ± 100 ± 200 | nA |

| Parameters / Test Conditions | Symbol | Min. | Max. | Unit |
|--|-------------------------------------|------|--------------|---------------|
| ON CHARACTERISTICS | | | | |
| Drain Current $V_{GS} = 0\text{ V}, V_{DS} = 80\text{ V}$ $V_{GS} = 0\text{ V}, V_{DS} = 160\text{ V}$ | 2N6788U 2N6790U I_{DSS1} | | 25 | μA |
| Drain Current $V_{GS} = 0\text{ V}, V_{DS} = 80\text{ V}, T_j = +125\text{ }^\circ\text{C}$ $V_{GS} = 0\text{ V}, V_{DS} = 160\text{ V}, T_j = +125\text{ }^\circ\text{C}$ | 2N6788U 2N6790U I_{DSS2} | | 0.25 | mA |
| Static Drain-Source On-State Resistance $V_{GS} = 10\text{ V}, I_D = 3.5\text{ A pulsed}$ $V_{GS} = 10\text{ V}, I_D = 2.25\text{ A pulsed}$ | 2N6788U 2N6790U $r_{DS(on)1}$ | | 0.30 0.80 | Ω |
| Static Drain-Source On-State Resistance $V_{GS} = 10\text{ V}, I_D = 6.0\text{ A pulsed}$ $V_{GS} = 10\text{ V}, I_D = 3.5\text{ A pulsed}$ | 2N6788U 2N6790U $r_{DS(on)2}$ | | 0.35 0.85 | Ω |
| Static Drain-Source On-State Resistance $T_j = +125\text{ }^\circ\text{C}$: $V_{GS} = 10\text{ V}, I_D = 3.5\text{ A pulsed}$ $V_{GS} = 10\text{ V}, I_D = 2.25\text{ A pulsed}$ | 2N6788U 2N6790U $r_{DS(on)3}$ | | 0.54 1.50 | Ω |
| Diode Forward Voltage $V_{GS} = 0\text{ V}, I_D = 6.0\text{ A pulsed}$ $V_{GS} = 0\text{ V}, I_D = 3.5\text{ A pulsed}$ | 2N6788U 2N6790U V_{SD} | | 1.8 1.5 | V |

ELECTRICAL CHARACTERISTICS @ $T_A = +25\text{ }^\circ\text{C}$, unless otherwise noted (continued)
DYNAMIC CHARACTERISTICS

| Parameters / Test Conditions | Symbol | Min. | Max. | Unit |
|--|-------------|------|--------------|------|
| Gate Charge: | | | | |
| On-State Gate Charge $V_{GS} = 10\text{ V}$, $I_D = 6.0\text{ A}$, $V_{DS} = 50\text{ V}$ $V_{GS} = 10\text{ V}$, $I_D = 3.5\text{ A}$, $V_{DS} = 100\text{ V}$ | $Q_{g(on)}$ | | 18.0 14.3 | nC |
| Gate to Source Charge $V_{GS} = 10\text{ V}$, $I_D = 6.0\text{ A}$, $V_{DS} = 50\text{ V}$ $V_{GS} = 10\text{ V}$, $I_D = 3.5\text{ A}$, $V_{DS} = 100\text{ V}$ | Q_{gs} | | 4.0 3.0 | nC |
| Gate to Drain Charge $V_{GS} = 10\text{ V}$, $I_D = 6.0\text{ A}$, $V_{DS} = 50\text{ V}$ $V_{GS} = 10\text{ V}$, $I_D = 3.5\text{ A}$, $V_{DS} = 100\text{ V}$ | Q_{gd} | | 9.0 9.0 | nC |

SWITCHING CHARACTERISTICS

| Parameters / Test Conditions | Symbol | Min. | Max. | Unit |
|---|--------------|------|------------|------|
| Turn-on delay time $I_D = 6.0\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 35\text{ V}$ $I_D = 3.5\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 74\text{ V}$ | $t_{d(on)}$ | | 40 | ns |
| Rinse time $I_D = 6.0\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 35\text{ V}$ $I_D = 3.5\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 74\text{ V}$ | t_r | | 70 50 | ns |
| Turn-off delay time $I_D = 6.0\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 35\text{ V}$ $I_D = 3.5\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 74\text{ V}$ | $t_{d(off)}$ | | 40 50 | ns |
| Fall time $I_D = 6.0\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 35\text{ V}$ $I_D = 3.5\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 74\text{ V}$ | t_f | | 70 50 | ns |
| Diode Reverse Recovery Time $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} \leq 50\text{ V}$, $I_F = 6.0\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} \leq 50\text{ V}$, $I_F = 3.5\text{ A}$ | t_{rr} | | 240 400 | ns |

GRAPHS

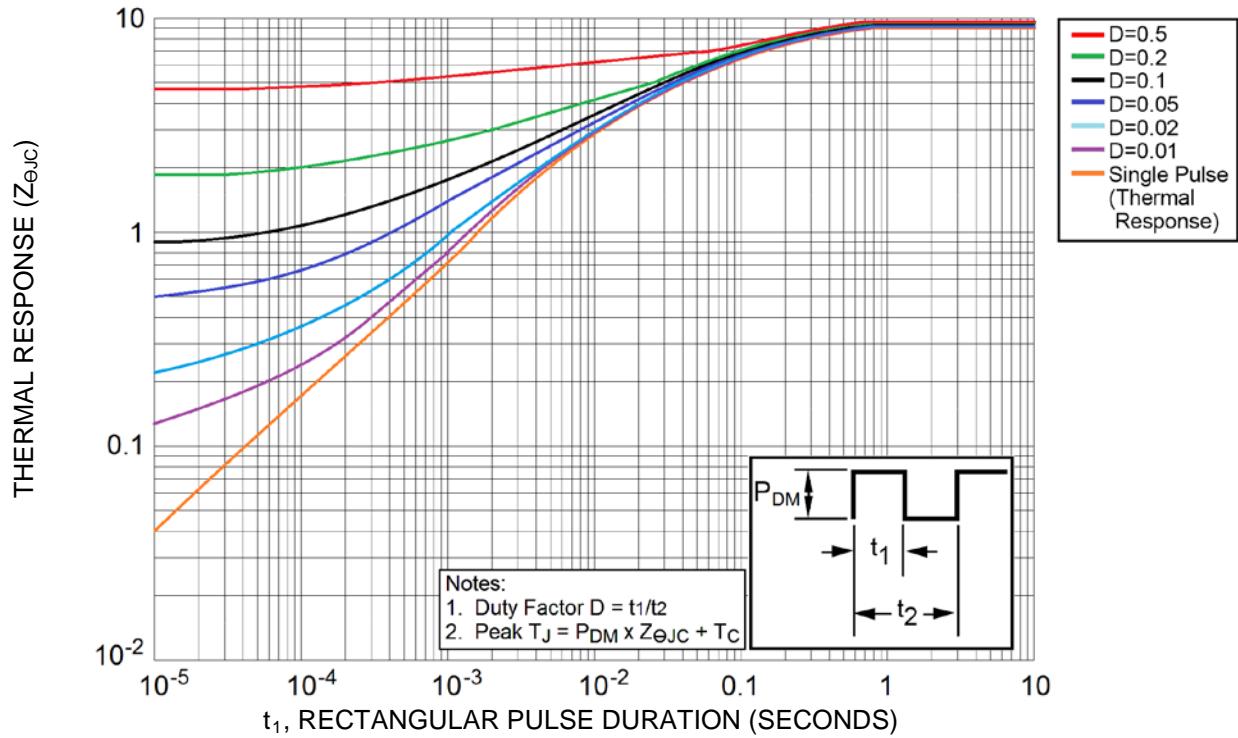


Figure 1
 Thermal Impedance Curves

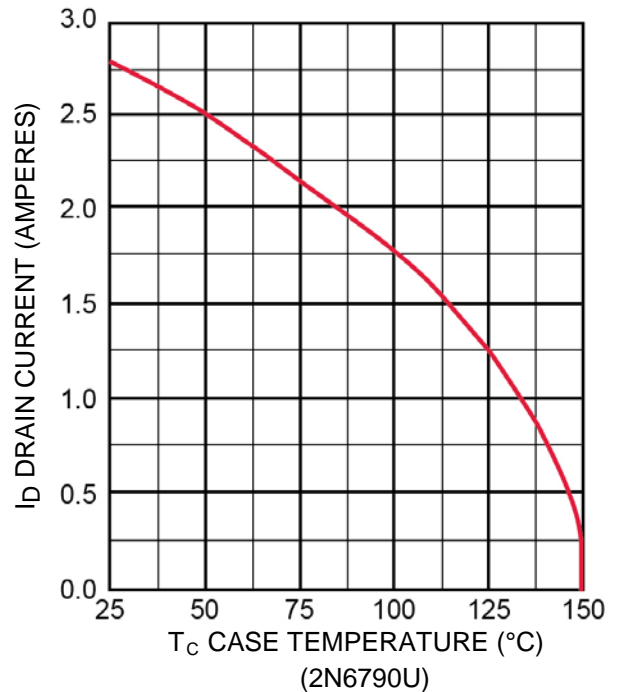
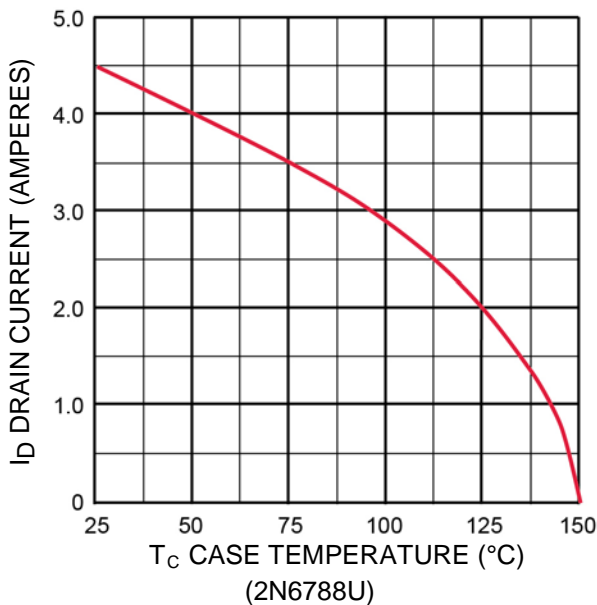
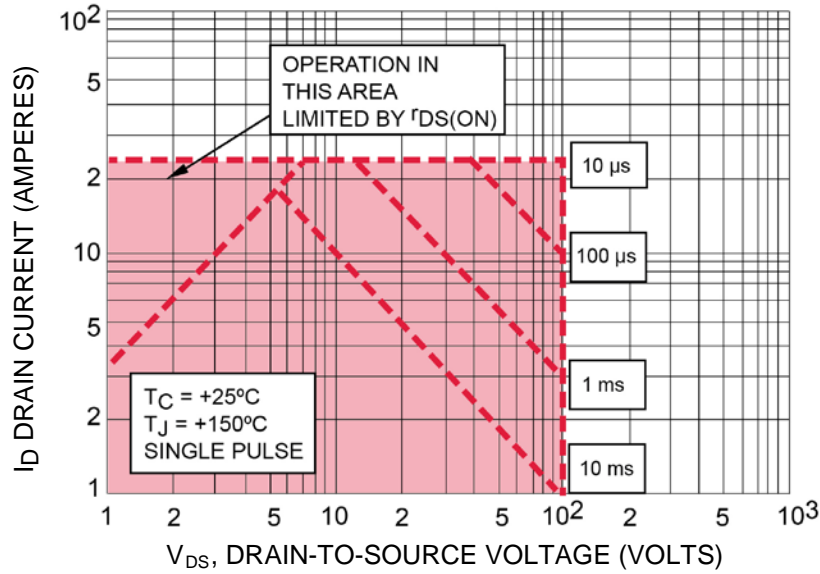
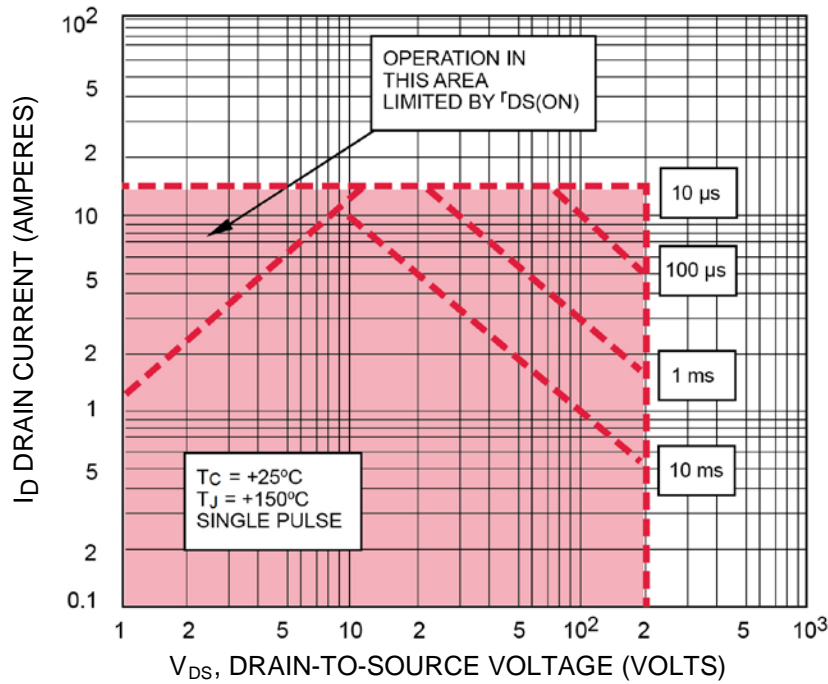


Figure 2
 Maximum Drain Current vs. Case Temperature Graph

GRAPHS (continued)

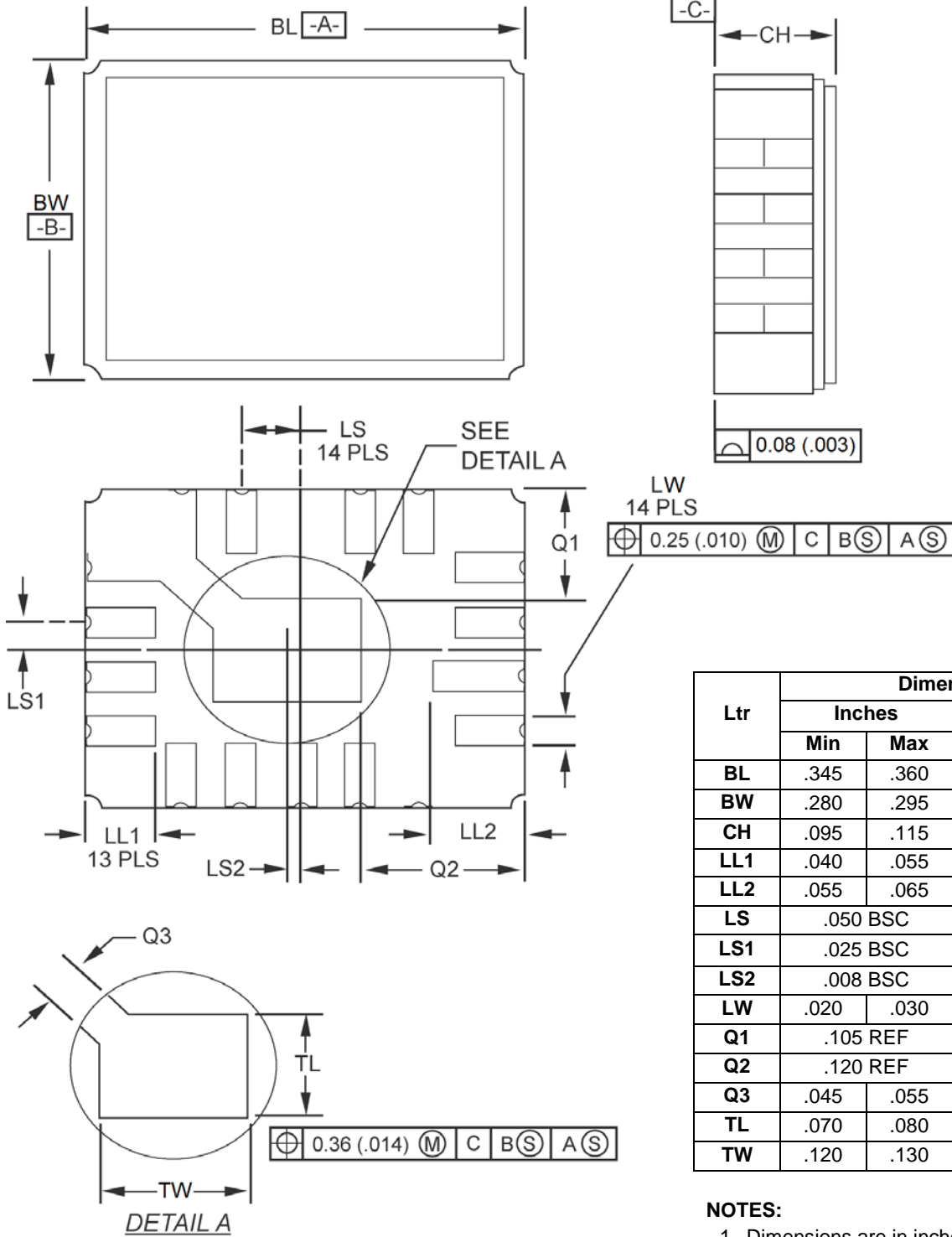


Maximum Safe Operating Area (2N6788U)



Maximum Safe Operating Area (2N6790U)

PACKAGE DIMENSIONS

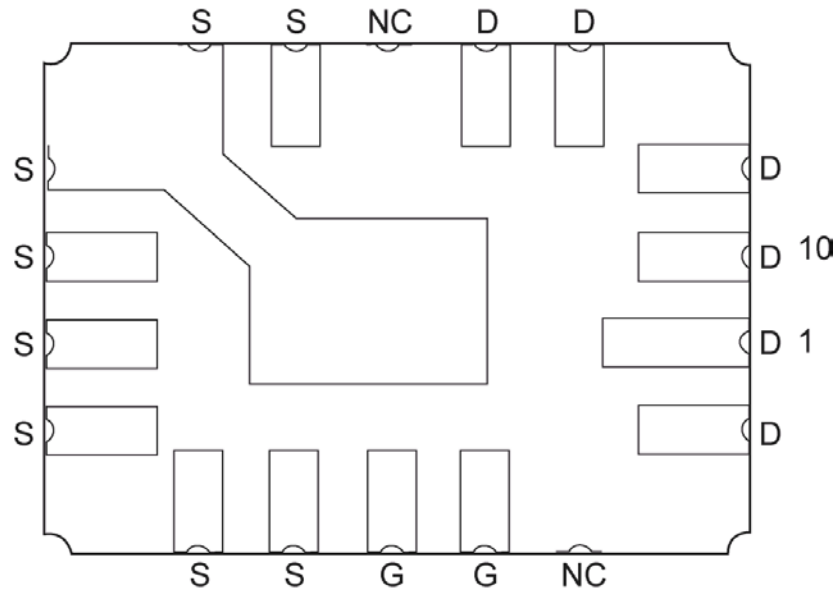


| Ltr | Dimensions | | | |
|-----|------------|------|-------------|------|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| BL | .345 | .360 | 8.77 | 9.14 |
| BW | .280 | .295 | 7.12 | 7.49 |
| CH | .095 | .115 | 2.42 | 2.92 |
| LL1 | .040 | .055 | 1.02 | 1.39 |
| LL2 | .055 | .065 | 1.40 | 1.65 |
| LS | .050 BSC | | 1.27 BSC | |
| LS1 | .025 BSC | | 0.635 BSC | |
| LS2 | .008 BSC | | 0.203 BSC | |
| LW | .020 | .030 | 0.51 | 0.76 |
| Q1 | .105 REF | | 2.67 REF | |
| Q2 | .120 REF | | 3.05 REF | |
| Q3 | .045 | .055 | 1.14 | 1.40 |
| TL | .070 | .080 | 1.78 | 2.03 |
| TW | .120 | .130 | 3.05 | 3.30 |

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to Φ x symbology.

PAD LAYOUT



PAD ASSIGNMENTS