# A3V26S004N

## Airfast RF Power LDMOS Transistor

Rev. 0 — December 2020

Data Sheet: Technical Data

This 26 dBm RF power LDMOS transistor is designed for cellular base station applications covering the frequency range of 2496 to 2690 MHz.

### 2600 MHz

- Typical Single-Carrier W-CDMA Reference Circuit Performance: $V_{DD}$ = 42 Vdc, $I_{DQ}$ = 17 mA, $P_{out}$ = 23.5 dBm Avg., Input Signal PAR = 9.9 dB @ 0.01% Probability on CCDF.(1)

| Frequency | $G_{ps}$ (dB) | $\eta_D$ (%) | Output PAR (dB) | ACPR (dBc) |
|---|---|---|---|---|
| 2515 MHz | 23.2 | 15.1 | 10.3 | –35.0 |
| 2595 MHz | 23.0 | 15.5 | 9.6 | –37.0 |
| 2675 MHz | 22.0 | 14.8 | 9.3 | –37.7 |

1. All data measured in reference circuit with device soldered to printed circuit board.

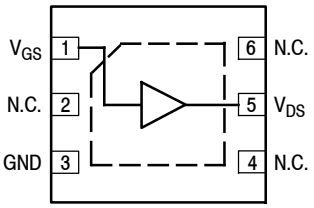
### Features

- Designed for low complexity analog or digital linearization systems
- Universal broadband driver
- Optimized for massive MIMO active antenna systems for 5G base stations

**A3V26S004N**

**2496–2690 MHz, 26 dBm Avg., 48 V AIRFAST RF POWER LDMOS TRANSISTOR**

**DFN 4.5 x 4 PLASTIC**




(Top View)

Note: Exposed backside of the package is the source terminal for the transistor.

**Figure 1. Pin Connections**

**Table 1. Maximum Ratings**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | –0.5, +105 | Vdc |
| Gate-Source Voltage | $V_{GS}$ | –6.0, +10 | Vdc |
| Operating Voltage | $V_{DD}$ | 55, +0 | Vdc |
| Storage Temperature Range | $T_{stg}$ | –65 to +150 | °C |
| Case Operating Temperature Range | $T_C$ | –40 to +150 | °C |
| Operating Junction Temperature Range (1,2) | $T_J$ | –40 to +225 | °C |

**Table 2. Thermal Characteristics**

| Characteristic | Symbol | Value (2,3) | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Case<br>Case Temperature 125°C, 26.0 dBm Avg., W-CDMA, 48 Vdc, $I_{DQ}$ = 17 mA, 2595 MHz | $R_{\theta JC}$ | 8.0 | °C/W |

**Table 3. ESD Protection Characteristics**

| Test Methodology | Class |
|---|---|
| Human Body Model (per JS-001-2017) | 1C |
| Charge Device Model (per JS-002-2014) | C2a |

**Table 4. Moisture Sensitivity Level**

| Test Methodology | Rating | Package Peak Temperature | Unit |
|---|---|---|---|
| Per JESD22-A113, IPC/JEDEC J-STD-020 | 3 | 260 | °C |

**Table 5. Electrical Characteristics** ($T_A$ = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **Off Characteristics** | | | | | |
| Zero Gate Voltage Drain Leakage Current<br>($V_{DS}$ = 105 Vdc, $V_{GS}$ = 0 Vdc) | $I_{DSS}$ | — | — | 10 | μAdc |
| Zero Gate Voltage Drain Leakage Current<br>($V_{DS}$ = 55 Vdc, $V_{GS}$ = 0 Vdc) | $I_{DSS}$ | — | — | 1 | μAdc |
| Gate-Source Leakage Current<br>($V_{GS}$ = 8 Vdc, $V_{DS}$ = 0 Vdc) | $I_{GSS}$ | — | — | 1 | μAdc |
| **On Characteristics** | | | | | |
| Gate Threshold Voltage<br>($V_{DS}$ = 10 Vdc, $I_D$ = 10 μAdc) | $V_{GS(th)}$ | 0.7 | 1.2 | 1.7 | Vdc |
| Gate Quiescent Voltage<br>($V_{DD}$ = 48 Vdc, $I_D$ = 16 mAdc, Measured in Functional Test) | $V_{GS(Q)}$ | 1.6 | 1.78 | 1.9 | Vdc |
| Drain-Source On-Voltage<br>($V_{GS}$ = 10 Vdc, $I_D$ = 75 mAdc) | $V_{DS(on)}$ | 0.2 | 0.6 | 0.9 | Vdc |

1. Continuous use at maximum temperature will affect MTTF.
2. MTTF calculator available at http://www.nxp.com.
3. Refer to AN1955, *Thermal Measurement Methodology of RF Power Amplifiers.* Go to http://www.nxp.com/RF and search for AN1955.

(continued)

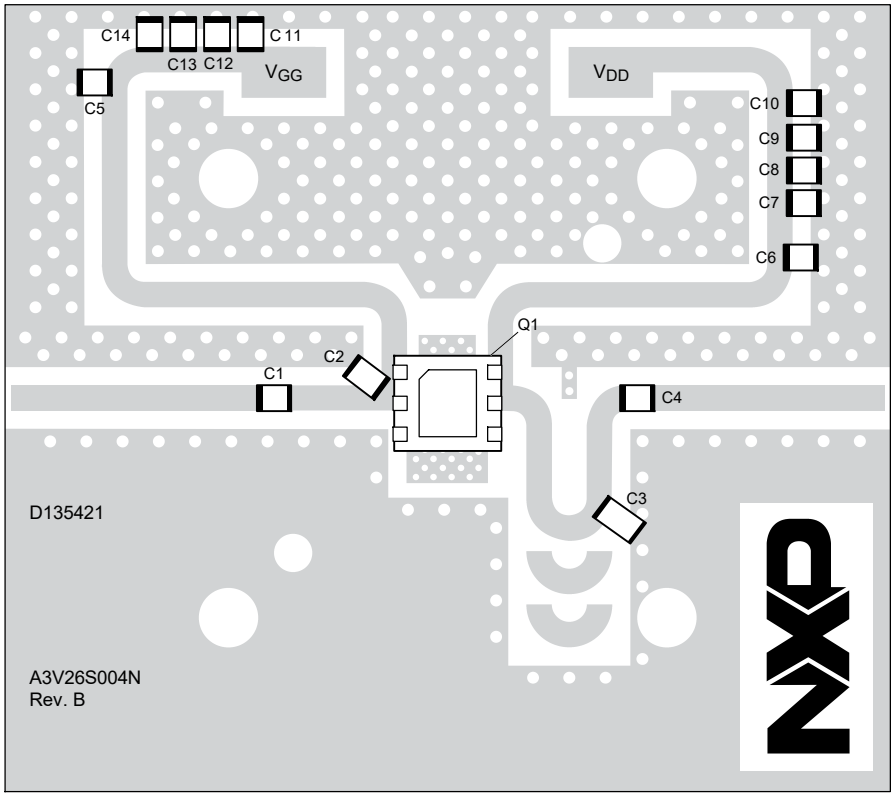
**Table 5. Electrical Characteristics** ($T_A$ = 25°C unless otherwise noted) **(continued)**

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **Functional Tests** (1) (In NXP Production Test Fixture, 50 ohm system) $V_{DD}$ = 48 Vdc, $I_{DQ}$ = 16 mA, $P_{out}$ = 26 dBm Avg., f = 2690 MHz, 1-tone CW. | | | | | |
| Power Gain | $G_{ps}$ | 19.5 | 23.3 | 26.0 | dB |
| Drain Efficiency | $\eta_D$ | 18.0 | 21.9 | — | % |
| $P_{out}$ @ 6 dB Compression Point | P6dB | 33.5 | 35.0 | — | dBm |
| **Wideband Ruggedness** (In NXP Reference Circuit, 50 ohm system) $I_{DQ}$ = 17 mA, f = 2595 MHz, Additive White Gaussian Noise (AWGN) with 10 dB PAR | | | | | |
| ISBW of 400 MHz at 55 Vdc, 1.5 W Avg. Modulated Output Power (3 dB Input Overdrive from 0.7 W Avg. Modulated Output Power) | No Device Degradation | | | | |
| **Typical Performance** (2) (In NXP Reference Circuit, 50 ohm system) $V_{DD}$ = 42 Vdc, $I_{DQ}$ = 17 mA, 2515–2675 MHz Bandwidth | | | | | |
| VBW Resonance Point (IMD Third Order Intermodulation Inflection Point) | $VBW_{res}$ | — | 170 | — | MHz |
| Gain Flatness in 160 MHz Bandwidth @ $P_{out}$ = 23.5 dBm Avg. | $G_F$ | — | 0.7 | — | dB |
| **Fast CW, 27 ms Sweep** | | | | | |
| $P_{out}$ @ 3 dB Compression Point | P3dB | — | 3.1 | — | W |
| AM/PM (Maximum value measured at the P3dB compression point across the 2515–2675 MHz bandwidth) | Φ | — | –23 | — | ° |
| Gain Variation over Temperature (–40°C to +85°C) | ΔG | — | 0.017 | — | dB/°C |
| Output Power Variation over Temperature (–40°C to +85°C) | ΔP1dB | — | 0.004 | — | dB/°C |

**Table 6. Ordering Information**

| Device | Tape and Reel Information | Package |
|---|---|---|
| A3V26S004NT6 | T6 Suffix = 5,000 Units, 12 mm Tape Width, 13-inch Reel | DFN 4.5 × 4 |

1. Part internally input matched.
2. All data measured in fixture with device soldered to printed circuit board.




Note: All data measured in reference circuit with device soldered to printed circuit board. *aaa-037822*

**Figure 2. A3V26S004N Reference Circuit Component Layout**

**Table 7. A3V26S004N Reference Circuit Component Designations and Values**

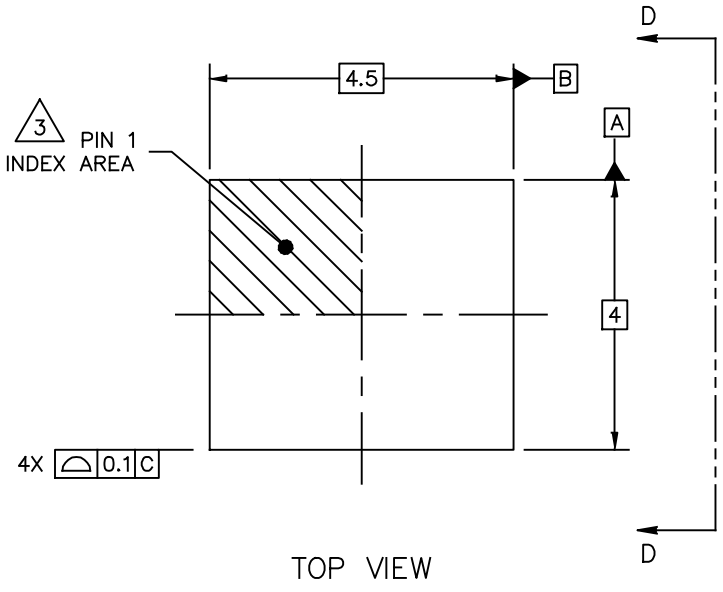
| Part | Description | Part Number | Manufacturer |
|---|---|---|---|
| C1 | 6.8 pF Chip Capacitor | 600F6R8BW250XT | ATC |
| C2 | 1.0 pF Chip Capacitor | 600F1R0BW250XT | ATC |
| C3 | 1.8 pF Chip Capacitor | 600F1R8BW250XT | ATC |
| C4 | 10 pF Chip Capacitor | 600F100FW250XT | ATC |
| C5, C6 | 20 pF Chip Capacitor | 600F200FW250XT | ATC |
| C7 | 0.1 μF Chip Capacitor | GRM319R71H104KA | Murata |
| C8 | 1 μF Chip Capacitor | GRM32ER72A105KA | Murata |
| C9, C10 | 10 μF Chip Capacitor | GRM31CR61H106KA | Murata |
| C11 | 10 μF Chip Capacitor | GRM21BR61C106KE | Murata |
| C12 | 1 μF Chip Capacitor | 08055C105KAT2A | AVX |
| C13 | 0.1 μF Chip Capacitor | GRM188R71H104KA | Murata |
| C14 | 2.2 nF Chip Capacitor | GRM1885C1H222JA | Murata |
| Q1 | RF Power LDMOS Transistor | A3V26S004N | NXP |
| PCB | Rogers RO4350B, 0.020″, $\varepsilon_r$ = 3.66 | D135421 | MTL |


**Figure 3. Product Marking**

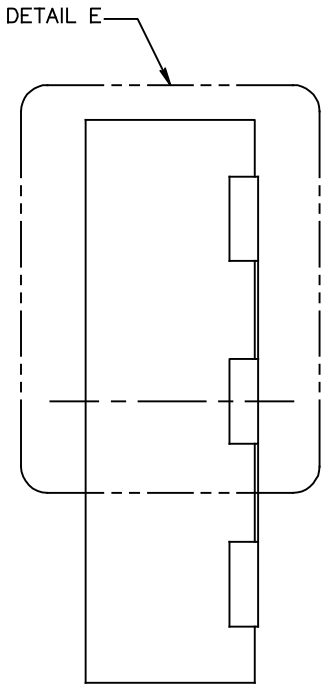
# Package Information

H–PDFN–6 I/O
4.5 X 4.0 X 1.2 PKG, 1.3 PITCH

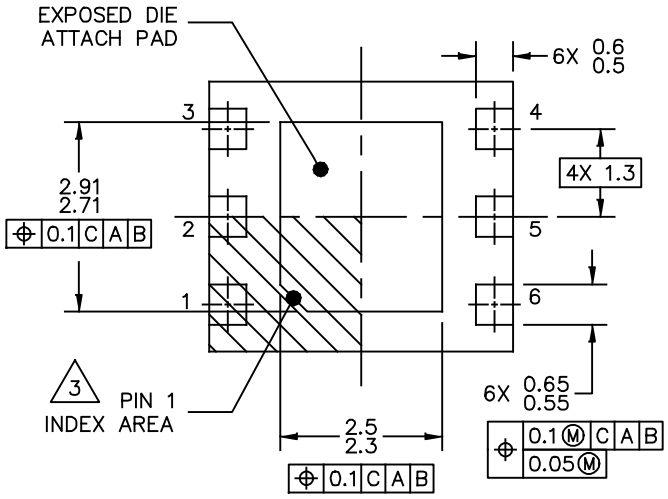
SOT2040–1




TOP VIEW




VIEW D–D




BOTTOM VIEW

RELEASED FOR EXTERNAL ASSEMBLY ONLY. THIS DESIGN ONLY MEETS EXTERNAL DESIGN AND ASSEMBLY RULES. MUST BE REVIEWED AND UPDATED BEFORE BEING ASSEMBLED INTERNALLY.

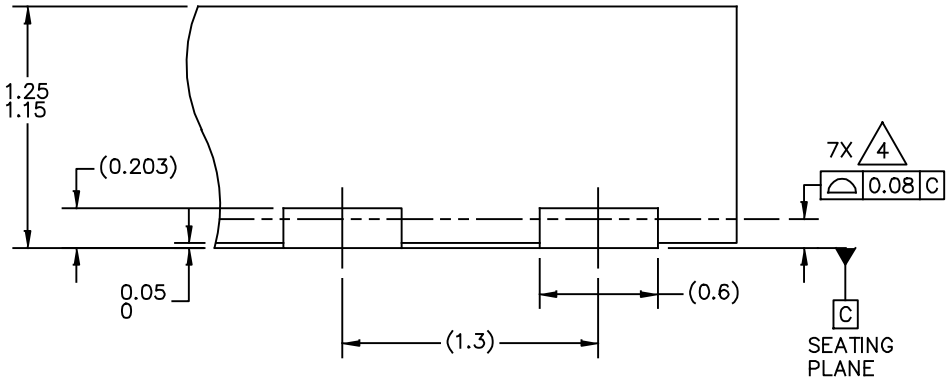


DATE: 01 AUG 2019

| MECHANICAL OUTLINE<br>PRINT VERSION NOT TO SCALE | STANDARD:<br>NON JEDEC | DRAWING NUMBER:<br>98ASA01496D | REVISION:<br>O | PAGE:<br>1 OF 6 |
|---|---|---|---|---|

H–PDFN–6 I/O
4.5 X 4.0 X 1.2 PKG, 1.3 PITCH

SOT2040–1




DETAIL E
VIEW ROTATED 90°CW



DATE: 01 AUG 2019

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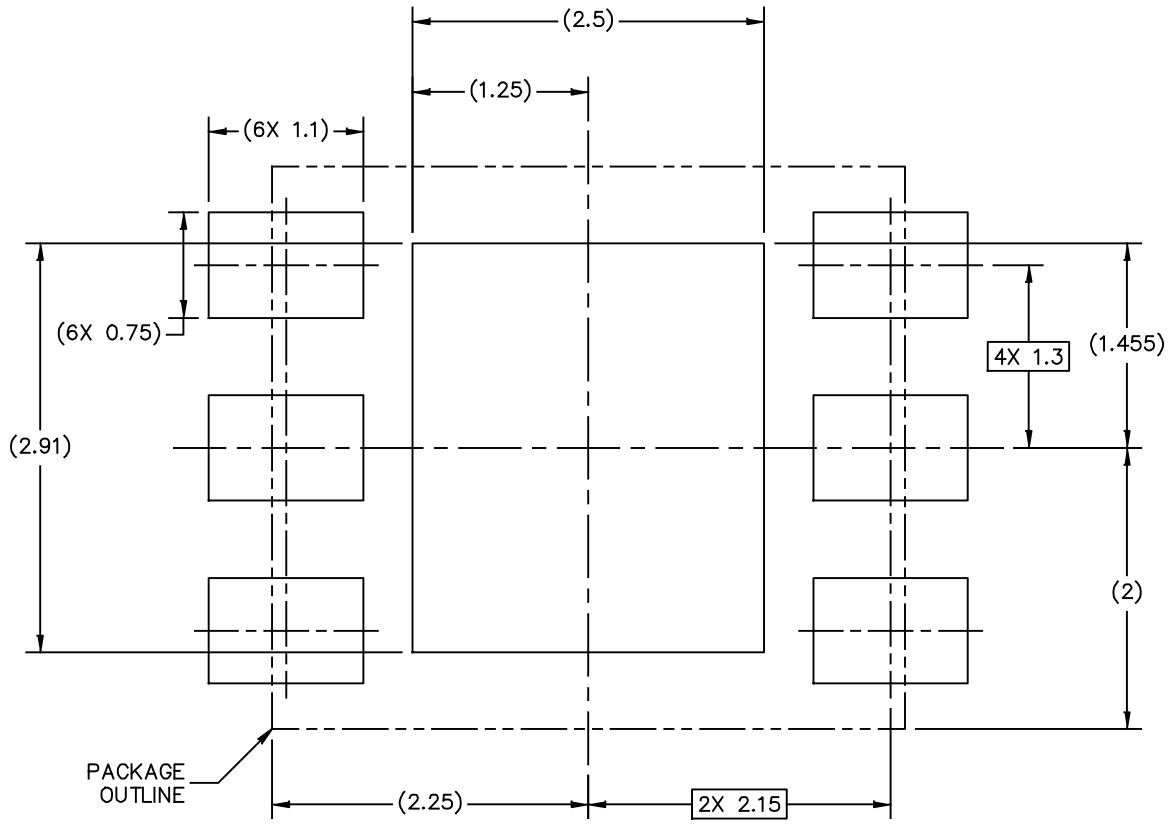
H–PDFN–6 I/O
4.5 X 4.0 X 1.2 PKG, 1.3 PITCH

SOT2040–1




## PCB DESIGN GUIDELINES – SOLDER MASK OPENING PATTERN

THIS SHEET SERVES ONLY AS A GUIDELINE TO HELP DEVELOP A USER SPECIFIC SOLUTION. DEVELOPMENT EFFORT WILL STILL BE REQUIRED BY END USERS TO OPTIMIZE PCB MOUNTING PROCESSES AND BOARD DESIGN IN ORDER TO MEET INDIVIDUAL/SPECIFIC REQUIREMENTS.



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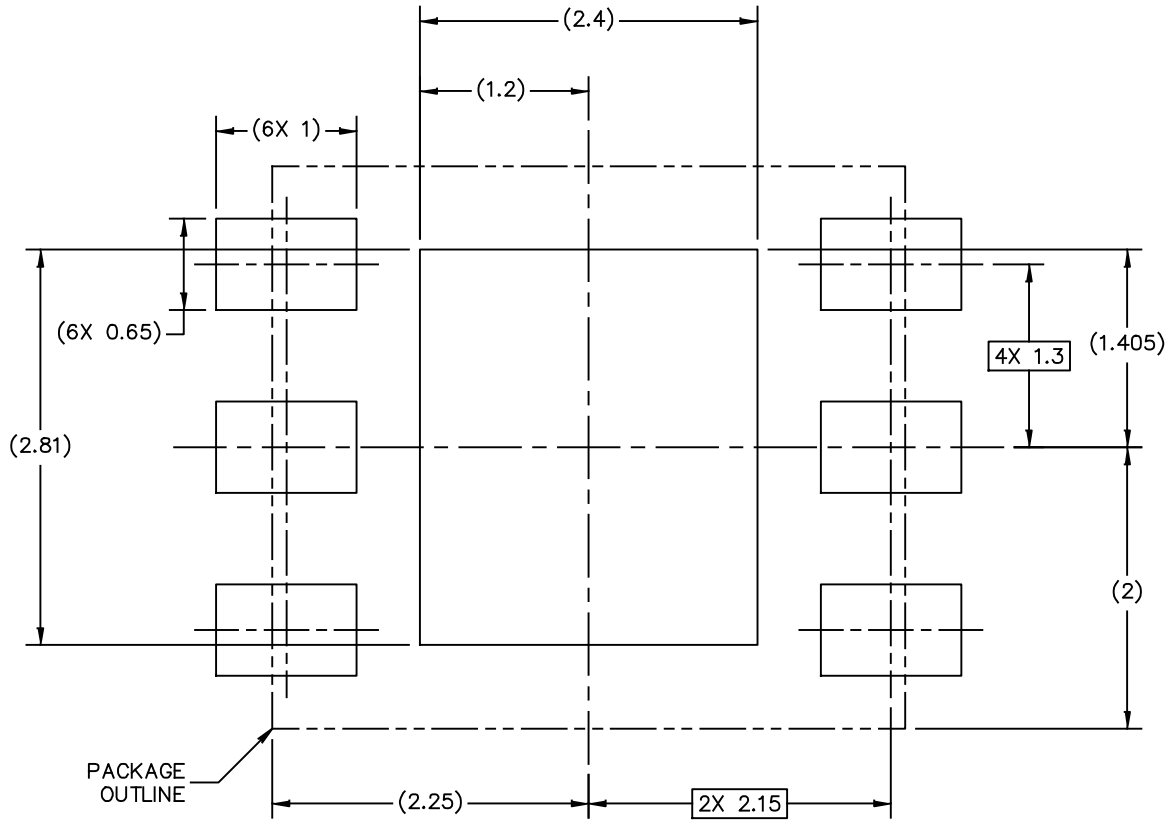
|---|---|---|---|---|

H–PDFN–6 I/O
4.5 X 4.0 X 1.2 PKG, 1.3 PITCH

SOT2040–1




## PCB DESIGN GUIDELINES – I/O PADS AND SOLDERABLE AREA

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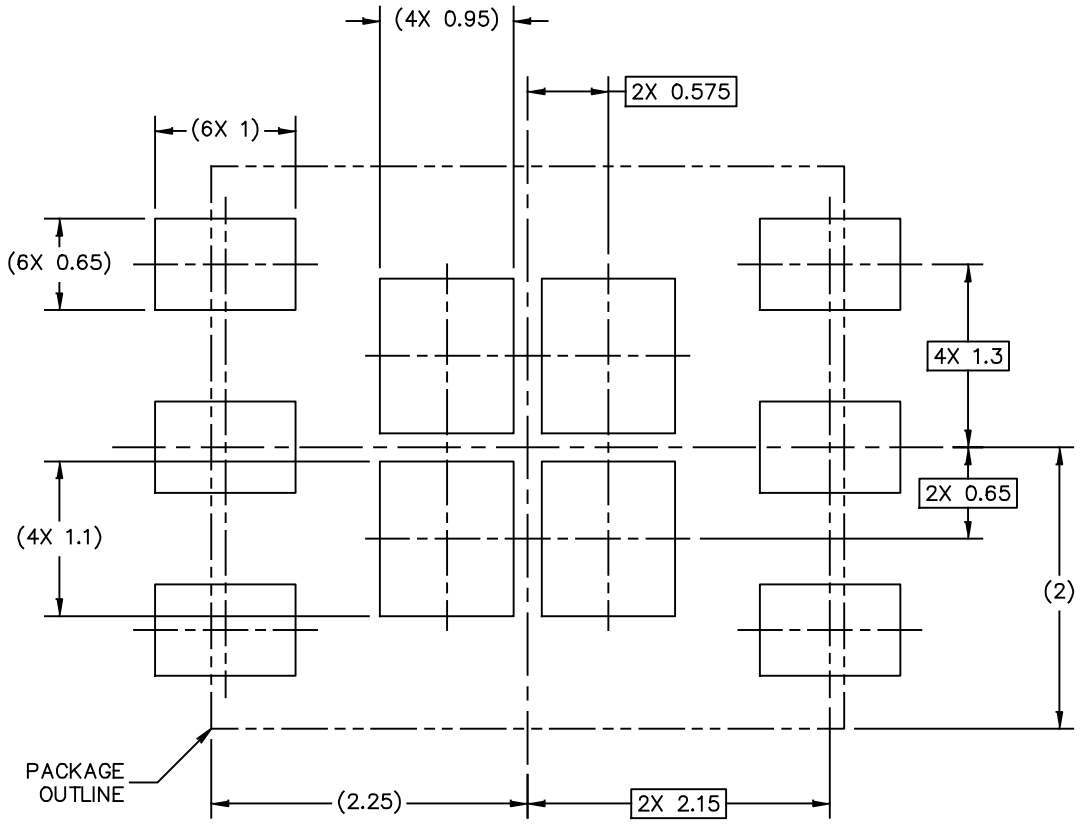
H–PDFN–6 I/O
4.5 X 4.0 X 1.2 PKG, 1.3 PITCH

SOT2040–1




RECOMMENDED STENCIL THICKNESS 0.125 OR 0.15

## PCB DESIGN GUIDELINES – SOLDER PASTE STENCIL

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|---|---|---|---|---|

H–PDFN–6 I/O
4.5 X 4.0 X 1.2 PKG, 1.3 PITCH

SOT2040–1

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M–1994.
3. PIN 1 FEATURE SHAPE, SIZE AND LOCATION MAY VARY.
4. COPLANARITY APPLIES TO LEADS AND DIE ATTACH FLAG.



DATE: 01 AUG 2019

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|---|---|---|---|---|

# Product Documentation, Software and Tools

Refer to the following resources to aid your design process.

**Application Notes**

- AN1907: Solder Reflow Attach Method for High Power RF Devices in Plastic Packages
- AN1955: Thermal Measurement Methodology of RF Power Amplifiers

**Software**

- Electromigration MTTF Calculator
- .s2p File

**Development Tools**

- Printed Circuit Boards

# Revision History

The following table summarizes revisions to this document.

| Revision | Date | Description |
|---|---|---|
| 0 | Dec. 2020 | • Initial release of data sheet |

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