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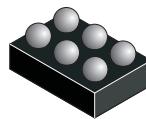
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[Texas Instruments](#)  
[CSD25303W1015](#)

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## P-Channel NexFET™ Power MOSFET

 Check for Samples: [CSD25303W1015](#)

### FEATURES

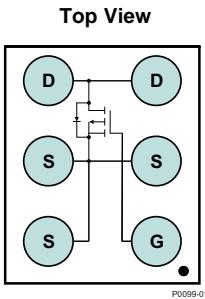
- Ultra Low  $Q_g$  and  $Q_{gd}$
- Small Footprint
- Low Profile 0.62mm Height
- Pb Free
- RoHS Compliant
- Halogen Free
- CSP 1 x 1.5 mm Wafer Level Package

### APPLICATIONS

- Battery Management
- Load Switch
- Battery Protection

### DESCRIPTION

The device has been designed to deliver the lowest on resistance and gate charge in the smallest outline possible with excellent thermal characteristics in an ultra low profile.



P0099-01

### PRODUCT SUMMARY

$T_A = 25^\circ\text{C}$ unless otherwise stated	TYPICAL VALUE		UNIT
$V_{DS}$	Drain to Source Voltage	-20	V
$Q_g$	Gate Charge Total (4.5V)	3.3	nC
$Q_{gd}$	Gate Charge Gate to Drain	0.6	nC
$R_{DS(on)}$	$V_{GS} = -1.8\text{V}$	72	$\text{m}\Omega$
	$V_{GS} = -2.5\text{V}$	56	$\text{m}\Omega$
	$V_{GS} = -4.5\text{V}$	46	$\text{m}\Omega$
$V_{GS(th)}$	Voltage Threshold	-0.65	V

### ORDERING INFORMATION

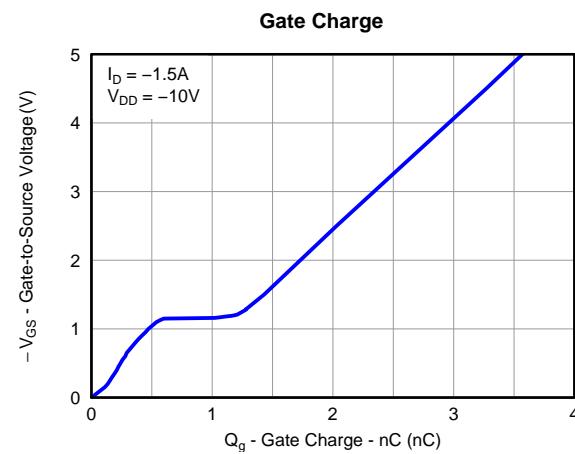
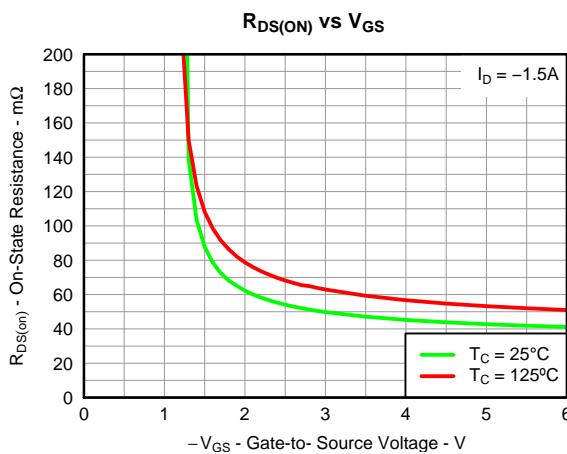
Device	Package	Media	Qty	Ship
CSD25303W1015	1 x 1.5 Wafer Level Package	7-inch reel	3000	Tape and Reel

### ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$ unless otherwise stated	VALUE	UNIT	
$V_{DS}$	Drain to Source Voltage	-20	V
$V_{GS}$	Gate to Source Voltage	$\pm 8$	V
$I_D$	Continuous Drain Current, $T_C = 25^\circ\text{C}$ <sup>(1)</sup>	-3	A
$I_{DM}$	Pulsed Drain Current, $T_A = 25^\circ\text{C}$ <sup>(2)</sup>	-9	A
$P_D$	Power Dissipation <sup>(1)</sup>	1.5	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_{Jr}$	Operating Junction Temperature Range		

(1) Typical  $R_{\theta JA} = 90^\circ\text{C/W}$  on 1in<sup>2</sup> Cu (2 oz.) on 0.060" thick FR4 PCB.

(2) Pulse width  $\leq 1\text{ms}$ , duty cycle  $\leq 2\%$



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These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

## ELECTRICAL CHARACTERISTICS

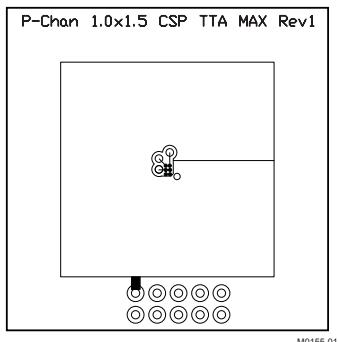
 (T<sub>A</sub> = 25°C unless otherwise stated)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain to Source Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA		-20		V
I <sub>DSS</sub>	Drain to Source Leakage Current	V <sub>GS</sub> = 0V, V <sub>DS</sub> = -16V			-1	μA
I <sub>GSS</sub>	Gate to Source Leakage Current	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±8V			-100	nA
V <sub>GS(th)</sub>	Gate to Source Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-0.4	-0.65	-1	V
R <sub>DS(on)</sub>	Drain to Source On Resistance	V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -1.5A		72	92	mΩ
		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -1.5A		56	71	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -1.5A		46	58	mΩ
g <sub>f</sub>	Transconductance	V <sub>DS</sub> = -10V, I <sub>D</sub> = -1.5A		9.6		S
<b>Dynamic Characteristics</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>GS</sub> = 0V, V <sub>DS</sub> = -10V, f = 1MHz		335	435	pF
C <sub>OSS</sub>	Output Capacitance			149	191	pF
C <sub>RSS</sub>	Reverse Transfer Capacitance			50	65	pF
R <sub>g</sub>				0.6	1.2	Ω
Q <sub>g</sub>	Gate Charge Total (-4.5V)	V <sub>DS</sub> = -10V, I <sub>D</sub> = -1.5A		3.3	4.3	nC
Q <sub>gd</sub>	Gate Charge Gate to Drain			0.6		nC
Q <sub>gs</sub>	Gate Charge Gate to Source			0.6		nC
Q <sub>g(th)</sub>	Gate Charge at V <sub>th</sub>			0.3		nC
Q <sub>OSS</sub>	Output Charge	V <sub>DS</sub> = -11V, V <sub>GS</sub> = 0V		2.5		nC
t <sub>d(on)</sub>	Turn On Delay Time	V <sub>DS</sub> = -10V, V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -1.5A R <sub>G</sub> = 4Ω		3.9		ns
t <sub>r</sub>	Rise Time			8.6		ns
t <sub>d(off)</sub>	Turn Off Delay Time			11.3		ns
t <sub>f</sub>	Fall Time			7.8		ns
<b>Diode Characteristics</b>						
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> = -1.5A, V <sub>GS</sub> = 0V		-0.72	-1	V
Q <sub>rr</sub>	Reverse Recovery Charge	V <sub>dd</sub> = -11V, I <sub>F</sub> = -1.5A, di/dt = 200A/μs		3.6		nC
t <sub>rr</sub>	Reverse Recovery Time			11.3		ns

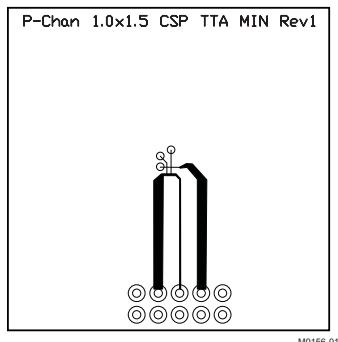
## THERMAL CHARACTERISTICS

 (T<sub>A</sub> = 25°C unless otherwise stated)

PARAMETER		MIN	TYP	MAX	UNIT
R <sub>θJA</sub>	Thermal Resistance Junction to Ambient (Minimum Cu area)			198	°C/W
	Thermal Resistance Junction to Ambient (1 in <sup>2</sup> Cu area)			112	°C/W



Max  $R_{\theta JA}$  = 112°C/W  
when mounted on 1  
inch<sup>2</sup> of 2 oz. Cu.



Max  $R_{\theta JA}$  = 198°C/W  
when mounted on  
minimum pad area of 2  
oz. Cu.

### TYPICAL MOSFET CHARACTERISTICS

( $T_A$  = 25°C unless otherwise stated)

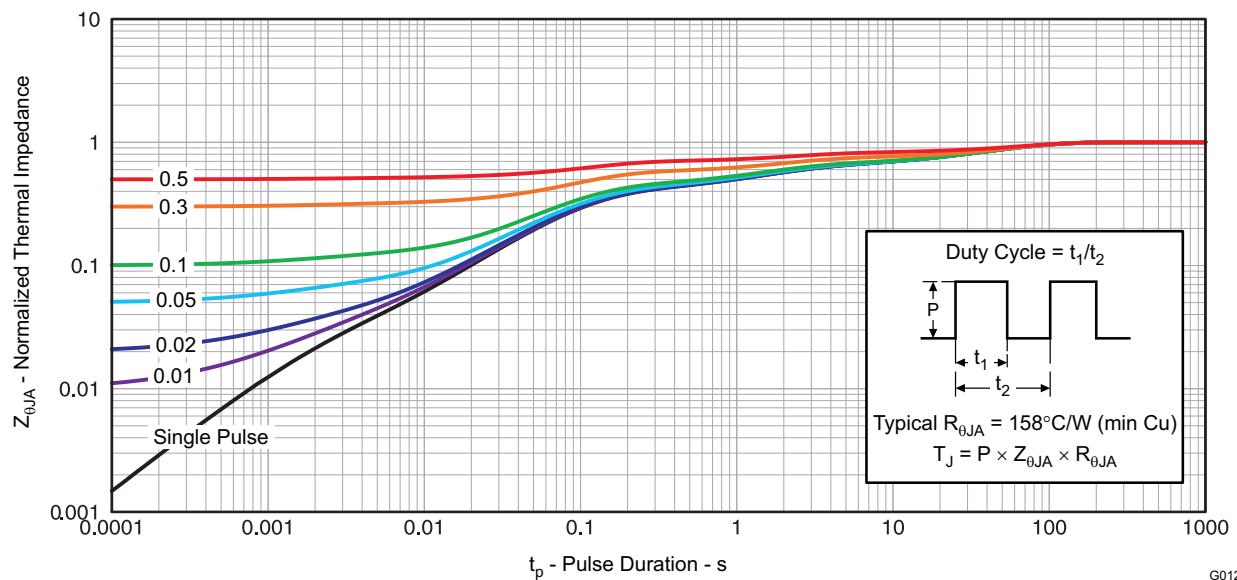


Figure 1. Transient Thermal Impedance

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### TYPICAL MOSFET CHARACTERISTICS (continued)

( $T_A = 25^\circ\text{C}$  unless otherwise stated)

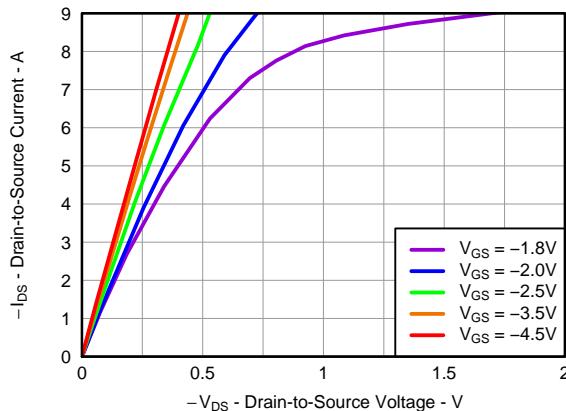


Figure 2. Saturation Characteristics

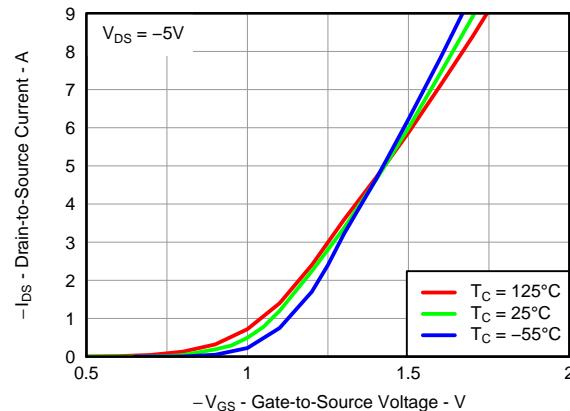


Figure 3. Transfer Characteristics

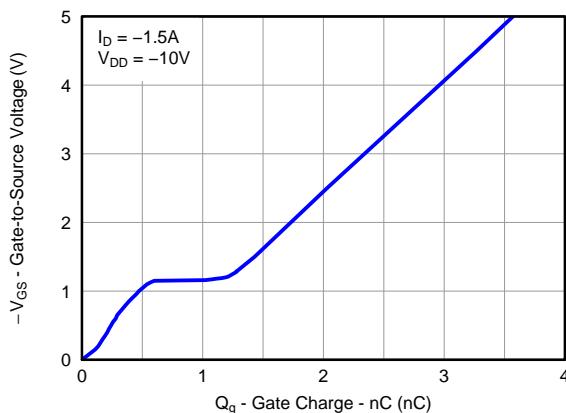


Figure 4. Gate Charge

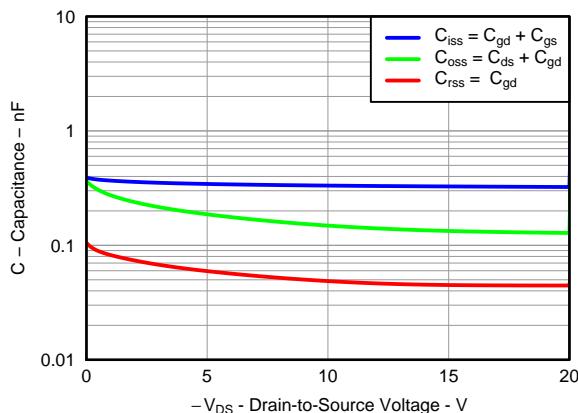


Figure 5. Capacitance

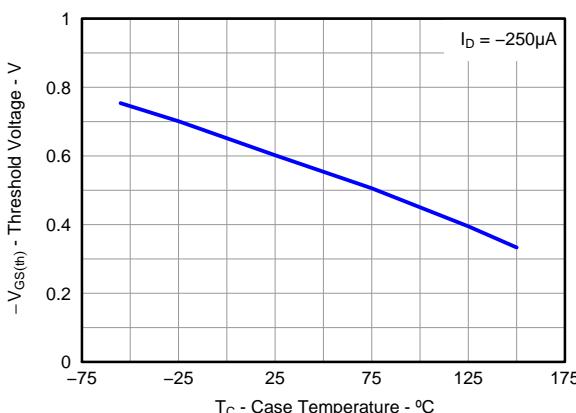


Figure 6. Threshold Voltage vs. Temperature

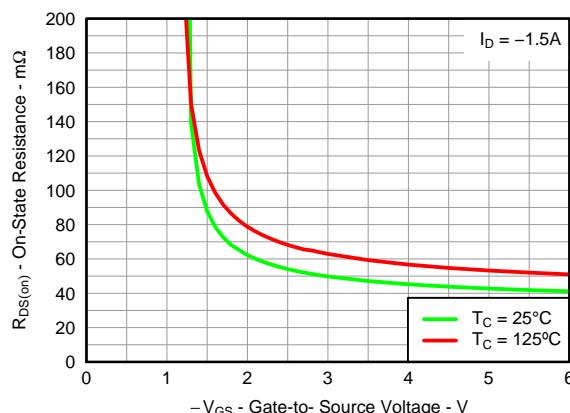
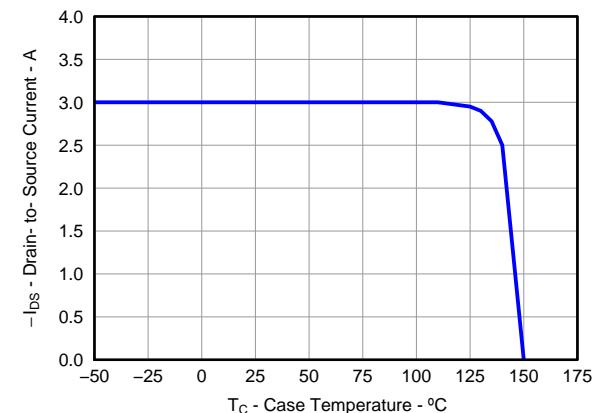
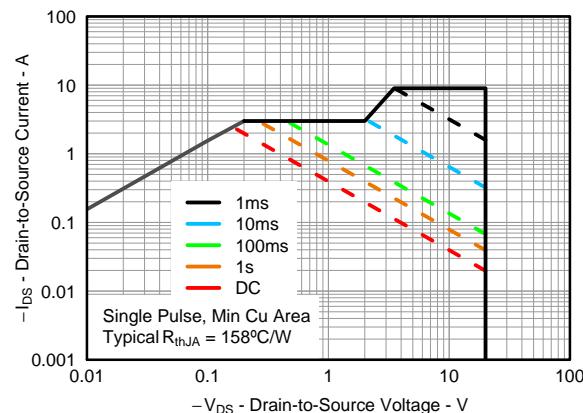
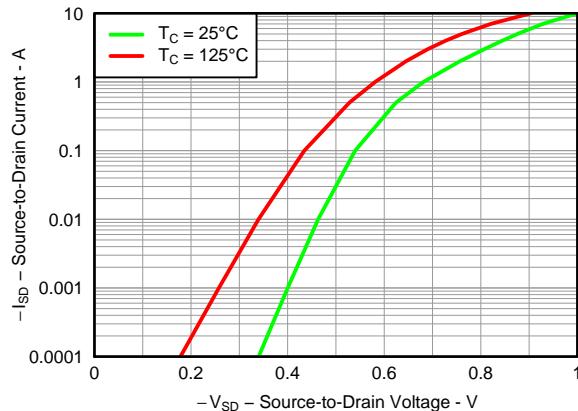
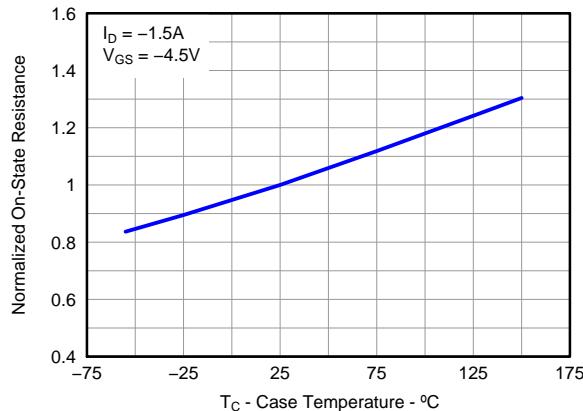


Figure 7. On Resistance vs. Gate Voltage

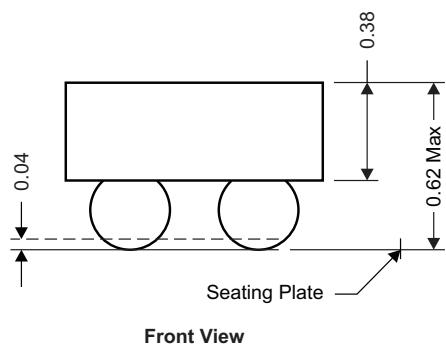
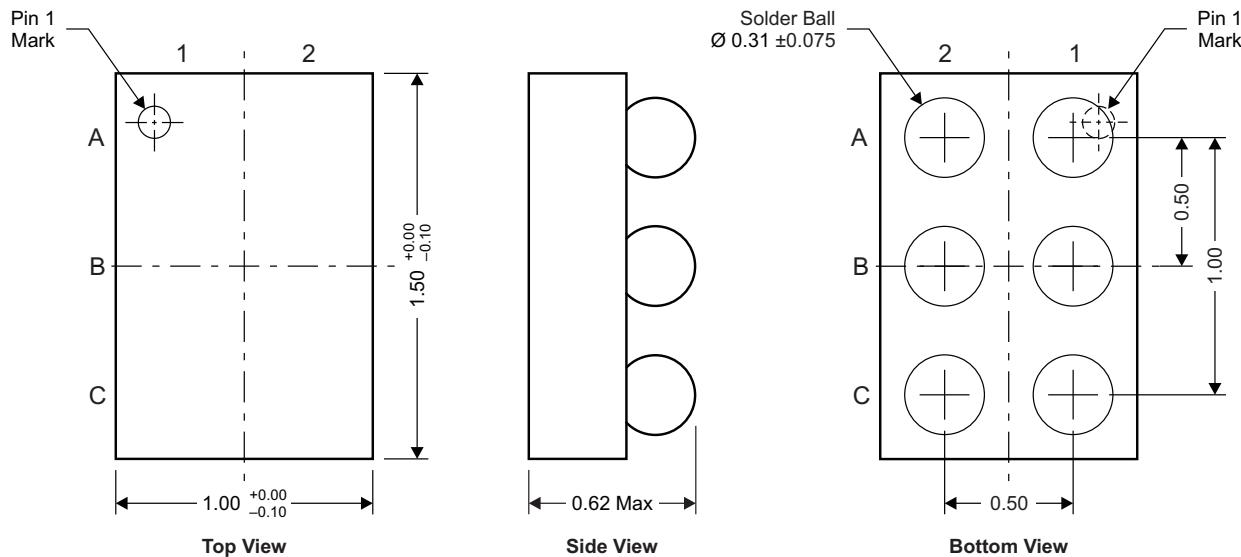
### TYPICAL MOSFET CHARACTERISTICS (continued)

( $T_A = 25^\circ\text{C}$  unless otherwise stated)



## MECHANICAL DATA

### CSD25303W1015 Package Dimensions



Front View

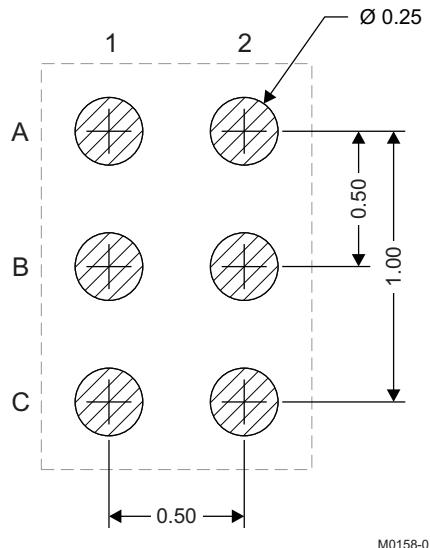
M0157-01

NOTE: All dimensions are in mm (unless otherwise specified)

#### Pinout

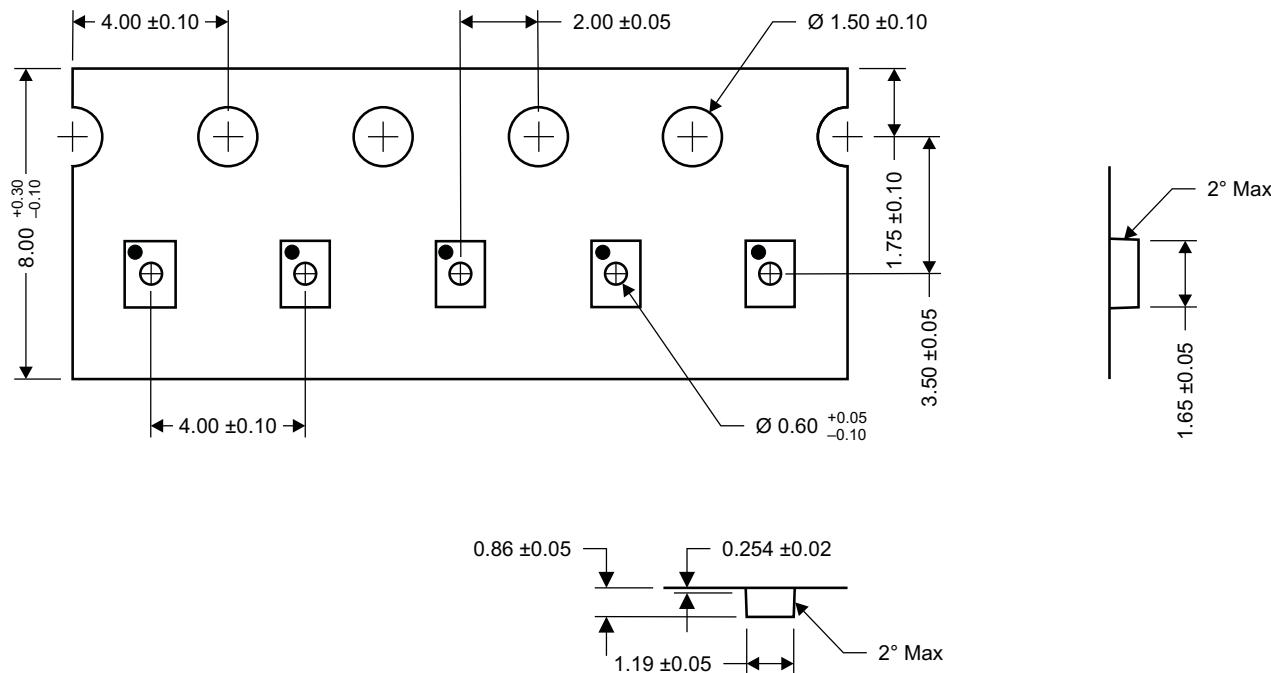
POSITION	DESIGNATION
C1, C2	Drain
A1	Gate
A2, B1, B2	Source

### Land Pattern Recommendation



NOTE: All dimensions are in mm (unless otherwise specified)

### Tape and Reel Information



NOTE: All dimensions are in mm (unless otherwise specified)

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
CSD25303W1015	LIFEBUY	DSBGA	YZC	6	3000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-55 to 150		

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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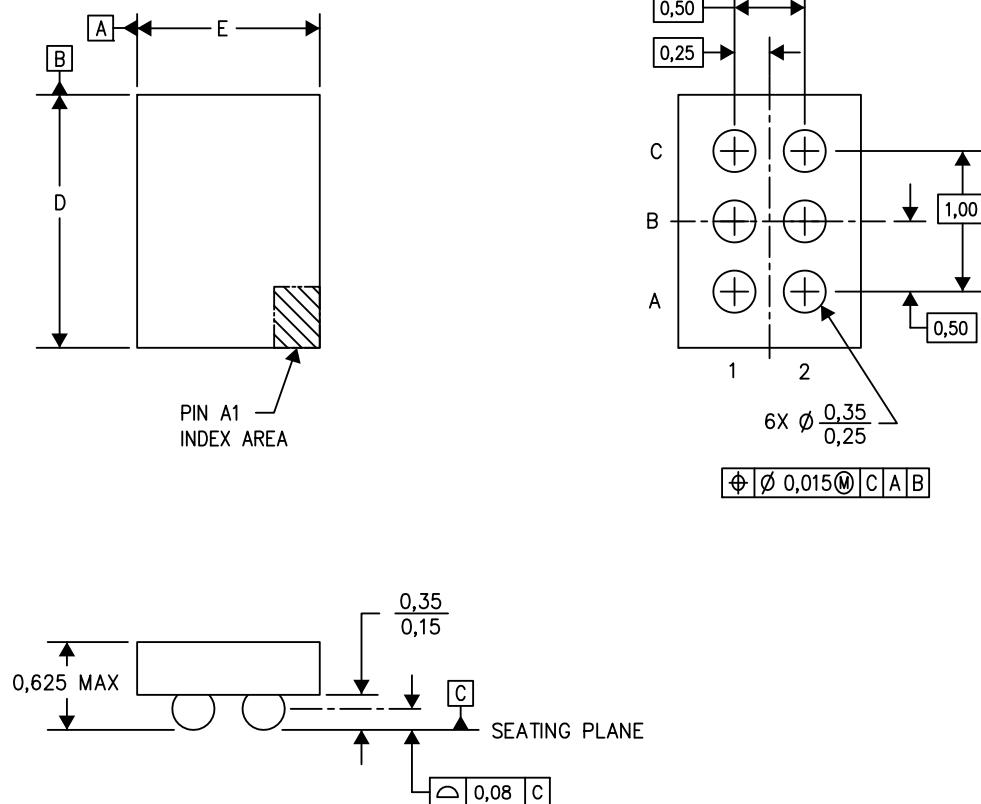
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## MECHANICAL DATA

YZC (R-XBGA-N6)

DIE-SIZE BALL GRID ARRAY



4205056/E 07/13

NOTES:

- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
- B. This drawing is subject to change without notice.
- C. NanoFree™ package configuration.

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