

P-Channel NexFET™ Power MOSFET

 Check for Samples: [CSD25201W15](#)

FEATURES

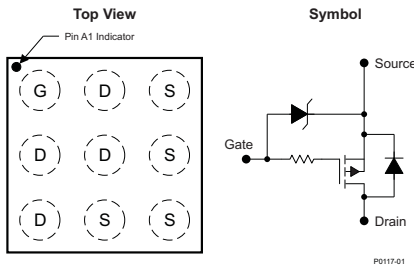
- Low Resistance
- Small Footprint 1.5-mm × 1.5-mm
- Gate ESD Protection –3kV
- Pb Free
- RoHS Compliant
- Halogen Free
- Gate-Source Voltage Clamp

APPLICATIONS

- Battery Management
- 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. Low on resistance coupled with the small footprint and low profile make the device ideal for battery operated space constrained applications.



PRODUCT SUMMARY

V_{DS}	Drain to Drain Voltage	-20	V
Q_g	Gate Charge Total (-4.5V)	4.3	nC
Q_{gd}	Gate Charge Gate to Drain	0.7	nC
$R_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = -1.8V$	52 mΩ
		$V_{GS} = -2.5V$	42 mΩ
		$V_{GS} = -4.5V$	33 mΩ
$V_{GS(th)}$	Threshold Voltage	-0.7	V

ORDERING INFORMATION

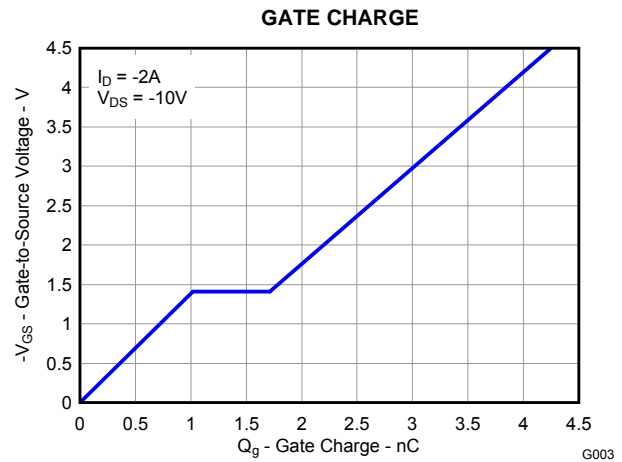
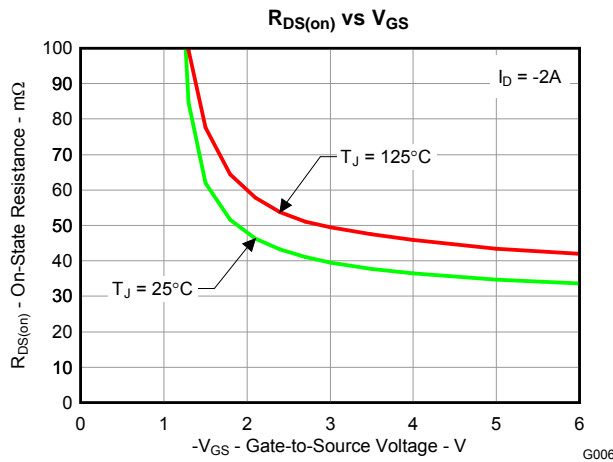
Device	Package	Media	Qty	Ship
CSD25201W15	1.5-mm × 1.5-mm Wafer Level Package	7-Inch Reel	3000	Tape and Reel

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	-6	V
I_D	Continuous Drain Current ⁽¹⁾⁽²⁾	4	A
	Pulsed Drain Current ⁽¹⁾⁽²⁾	4	A
I_G	Continuous Gate Current ⁽¹⁾⁽²⁾	0.5	A
	Pulsed Gate Current ⁽¹⁾⁽²⁾	7	A
P_D	Power Dissipation ⁽¹⁾	1.5	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$

(1) Based on Min Cu footprint

(2) Ball limited



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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

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Static Characteristics						
BV_{DSS}	Drain to Source Voltage	$V_{GS} = 0V, I_{DS} = -250\mu A$	-20			V
BV_{GSS}	Gate to Source Voltage	$V_{DS} = 0V, I_G = -250\mu A$	-6.1		-7.2	V
I_{DSS}	Drain to Source Leakage Current	$V_{GS} = 0V, V_{DS} = -16V$			-1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{DS} = 0V, V_{GS} = -6V$			-100	nA
$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{DS} = V_{GS}, I_{DS} = -250\mu A$	-0.4	-0.7	-1.1	V
$R_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = -1.8V, I_{DS} = -2A$		52	70	m Ω
		$V_{GS} = -2.5V, I_{DS} = -2A$		42	50	m Ω
		$V_{GS} = -4.5V, I_{DS} = -2A$		33	40	m Ω
g_{fs}	Transconductance	$V_{DS} = -10V, I_{DS} = -2A$		12		S
Dynamic Characteristics						
C_{ISS}	Input Capacitance	$V_{GS} = 0V, V_{DS} = -10V,$ $f = 1MHz$		490	640	pF
C_{OSS}	Output Capacitance			215	280	pF
C_{RSS}	Reverse Transfer Capacitance			70	91	pF
R_G	Series Gate Resistance ⁽¹⁾			26	35	Ω
Q_g	Gate Charge Total (-4.5V)	$V_{DS} = -10V,$ $I_O = -2A$		4.3	5.6	nC
Q_{gd}	Gate Charge - Gate to Drain			0.7		nC
Q_{gs}	Gate Charge - Gate to Source			1		nC
$Q_{g(th)}$	Gate Charge at V_{th}			0.3		nC
Q_{OSS}	Output Charge	$V_{DS} = -9.5V, V_{GS} = 0V$		3.1		nC
$t_{d(on)}$	Turn On Delay Time ⁽²⁾	$V_{DS} = -10V, V_{GS} = -4.5V,$ $I_{DS} = -2A, R_G = 2\Omega$		9.5		ns
t_r	Rise Time ⁽²⁾			11		ns
$t_{d(off)}$	Turn Off Delay Time ⁽²⁾			51		ns
t_f	Fall Time ⁽²⁾			38		ns
Diode Characteristics						
V_{SD}	Diode Forward Voltage	$I_{DS} = -2A, V_{GS} = 0V$		0.7	1	V
Q_{rr}	Reverse Recovery Charge	$V_{DD} = -9.5V, I_F = -2A,$ $di/dt = 200A/\mu s$		5.7		nC
t_{rr}	Reverse Recovery Time			10		ns

(1) Includes gate clamp resistor

(2) External R_G is in addition to the internal gate clamp resistor

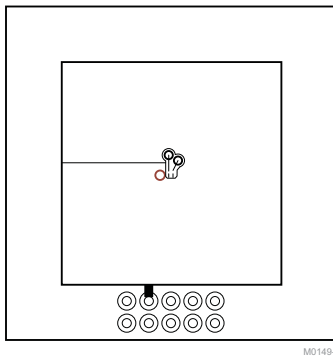
THERMAL CHARACTERISTICS

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

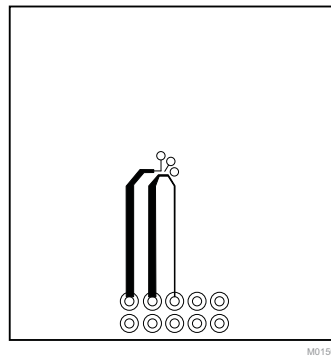
PARAMETER		MIN	TYP	MAX	UNIT
$R_{\theta JA}$	Junction to Ambient Thermal Resistance ⁽¹⁾			283	$^\circ\text{C}/\text{W}$
	Junction to Ambient Thermal Resistance ⁽²⁾			185	$^\circ\text{C}/\text{W}$

(1) Device mounted on FR4 material with minimum Cu mounting area.

(2) Device mounted on FR4 material with 1-inch² (6.45-cm²), 2-oz. (0.071-mm thick) Cu.



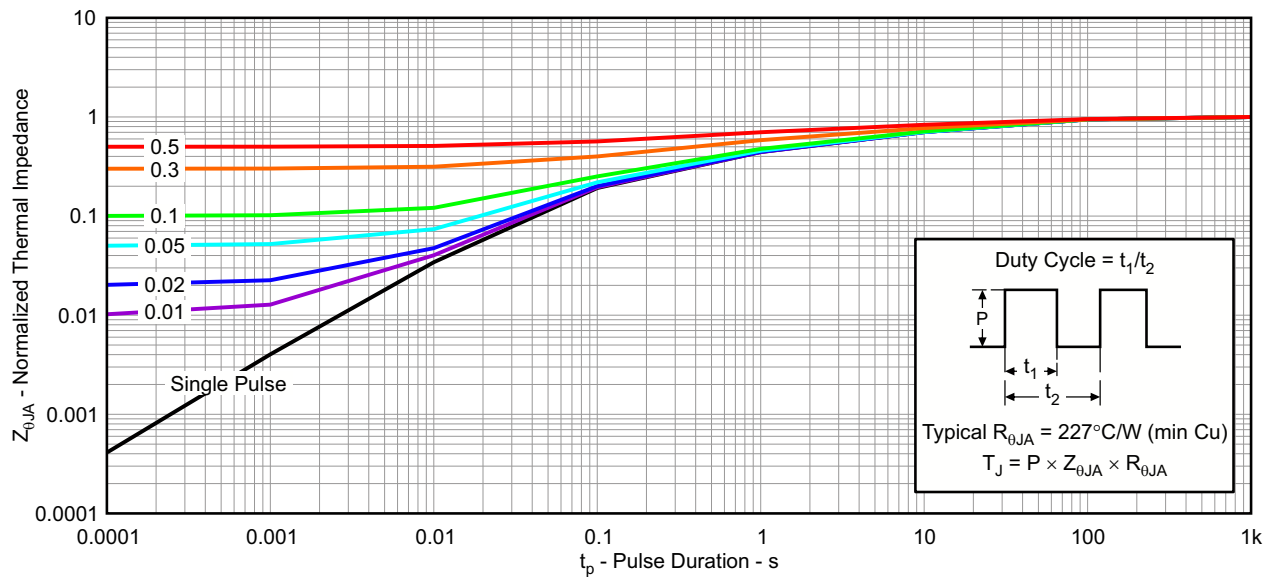
Max $R_{\theta JA} = 185^{\circ}\text{C/W}$
 when mounted on
 1 inch² (6.45 cm²) of
 2-oz. (0.071-mm thick)
 Cu.



Max $R_{\theta JA} = 283^{\circ}\text{C/W}$
 when mounted on a
 minimum pad area of
 2-oz. (0.071-mm thick)
 Cu.

TYPICAL MOSFET CHARACTERISTICS

$T_A = 25^{\circ}\text{C}$, unless stated otherwise.



G012

Figure 1. Transient Thermal Impedance

TYPICAL MOSFET CHARACTERISTICS (continued)

$T_A = 25^\circ\text{C}$, unless stated otherwise.

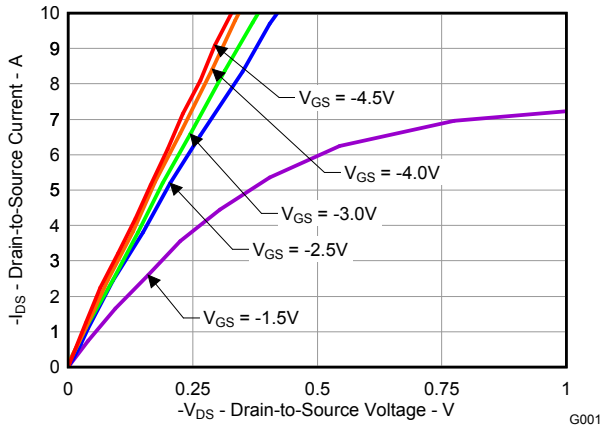


Figure 2. Saturation Characteristics

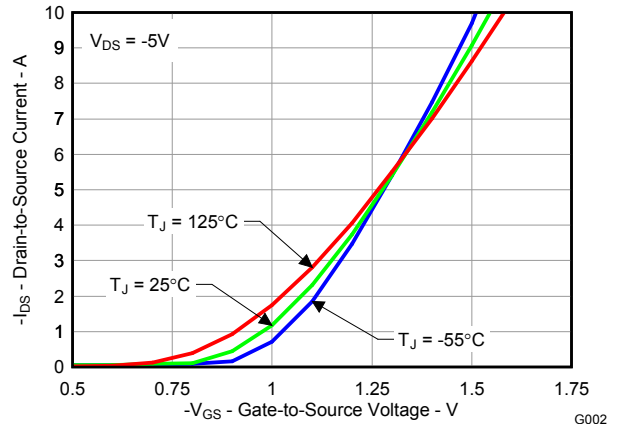


Figure 3. Transfer Characteristics

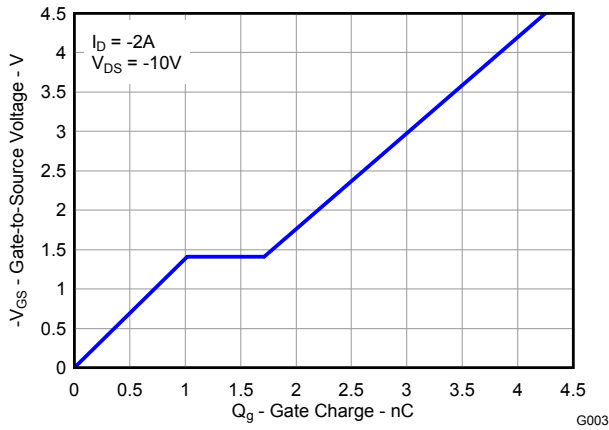


Figure 4. Gate Charge

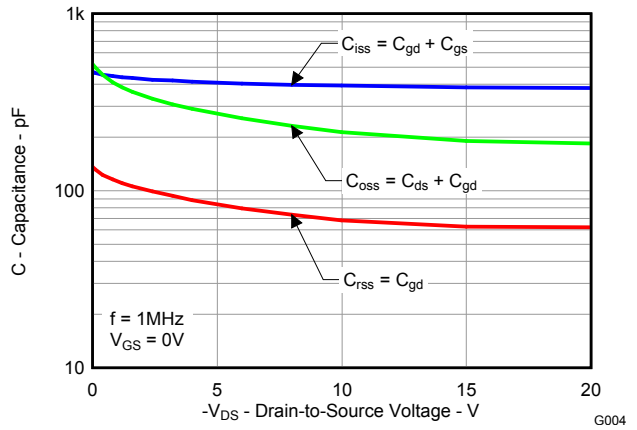


Figure 5. Capacitance

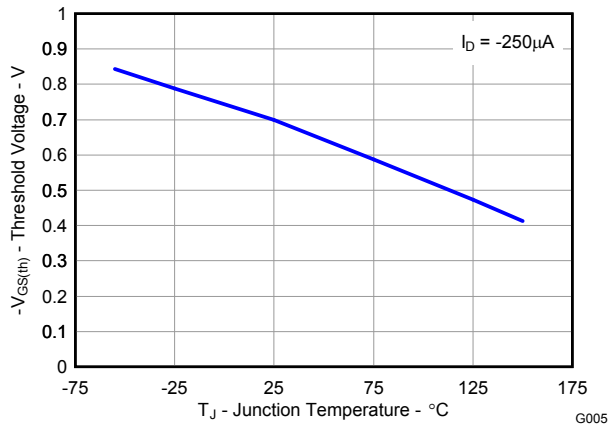


Figure 6. Threshold Voltage vs. Temperature

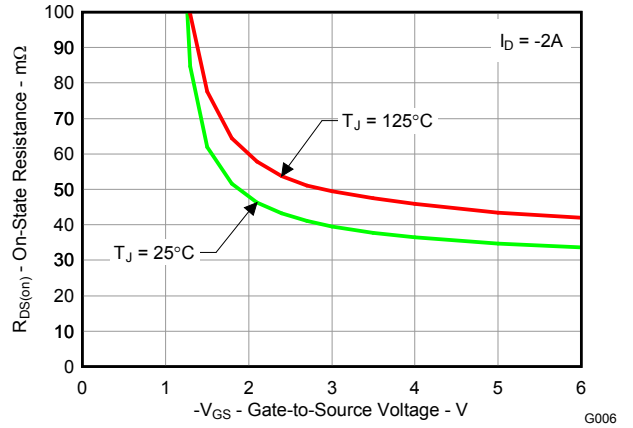


Figure 7. On-State Resistance vs. Gate-to-Source Voltage

TYPICAL MOSFET CHARACTERISTICS (continued)

$T_A = 25^\circ\text{C}$, unless stated otherwise.

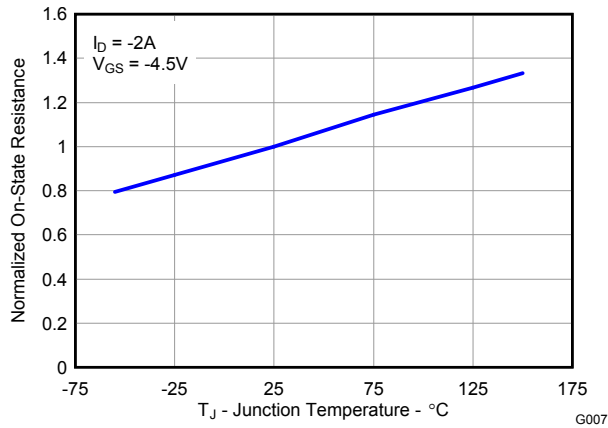


Figure 8. Normalized On-State Resistance vs. Temperature

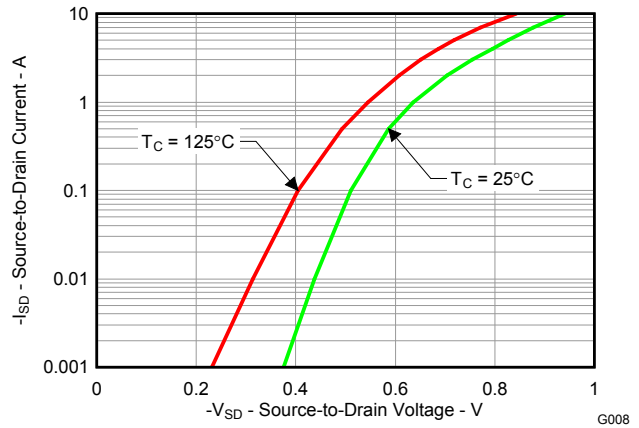


Figure 9. Typical Diode Forward Voltage

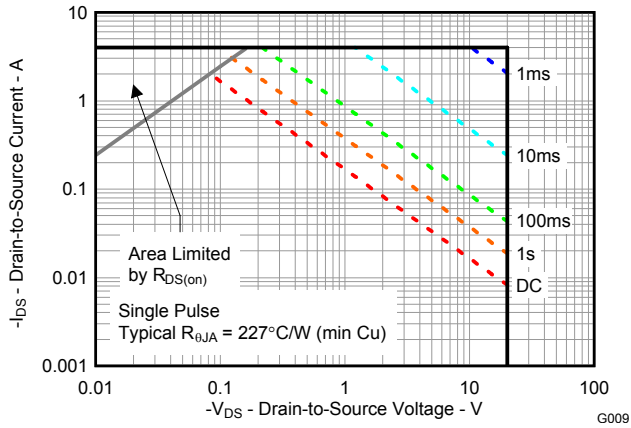


Figure 10. Maximum Safe Operating Area

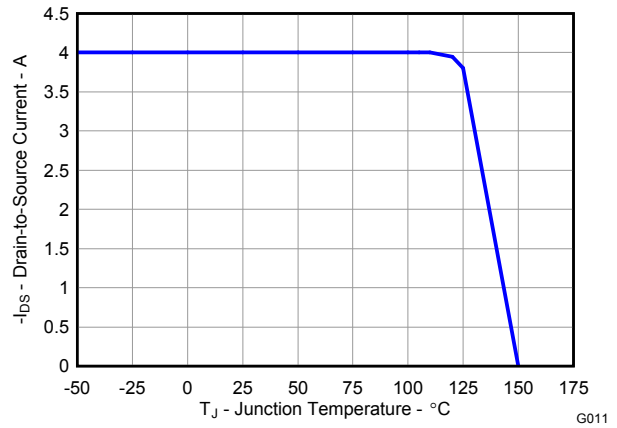
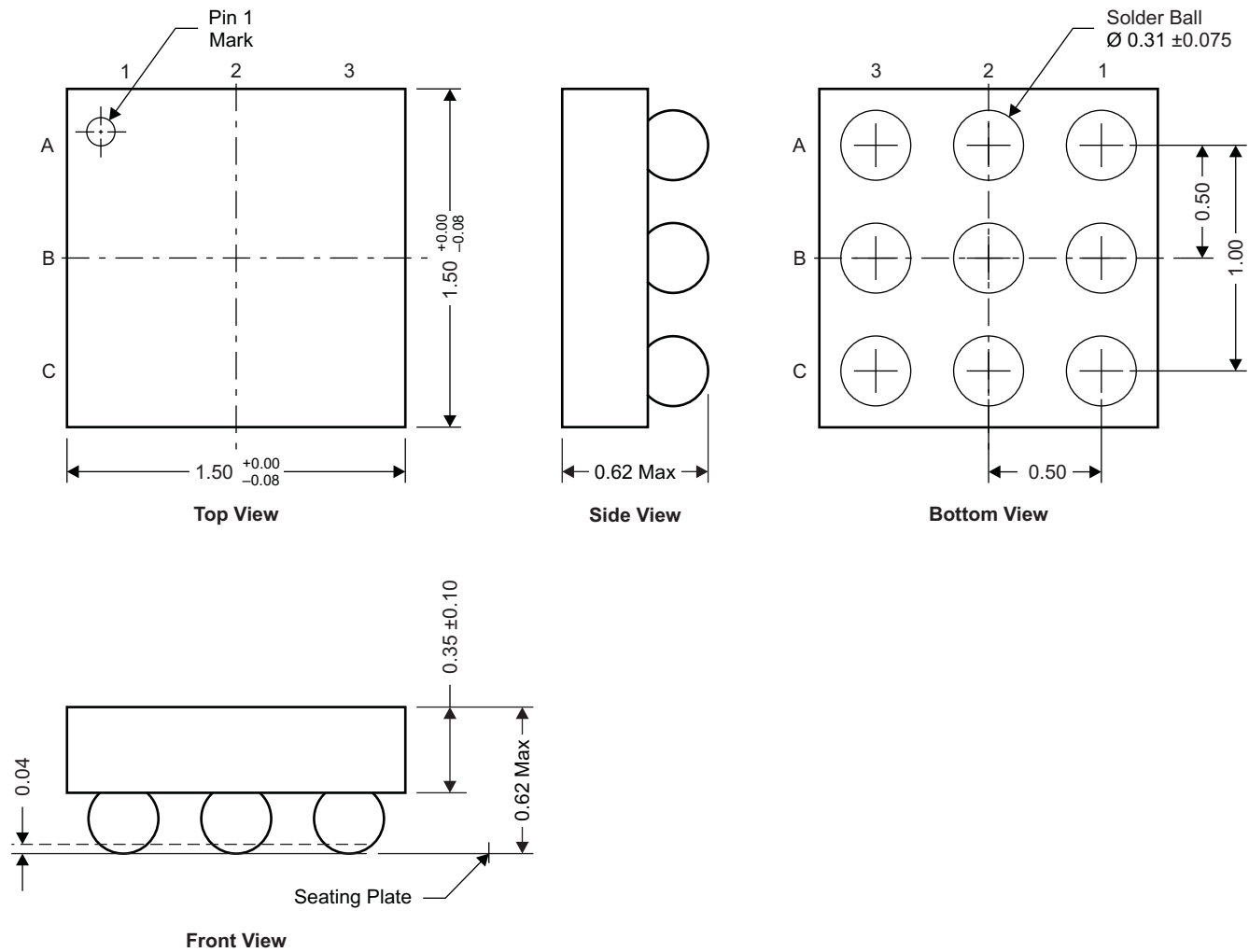


Figure 11. Maximum Drain Current vs. Temperature

MECHANICAL DATA

CSD25201W15 Package Dimensions



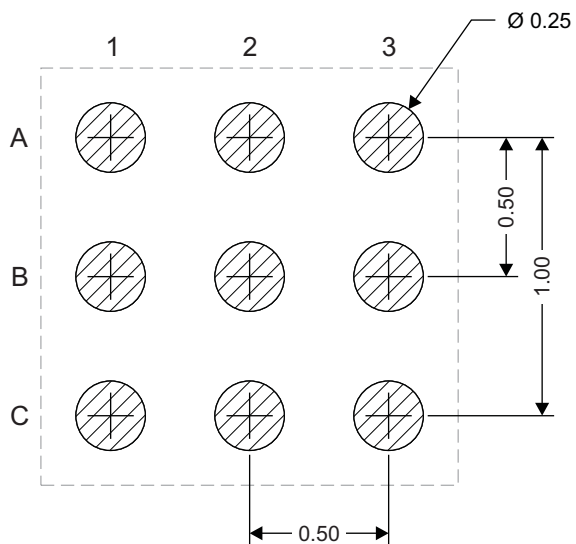
NOTE: All dimensions are in mm (unless otherwise specified)

M0171-01

Pinout

POSITION	DESIGNATION
A1	Gate
A2, B1, B2, C1	Drain
A3, B3, C2, C3	Source

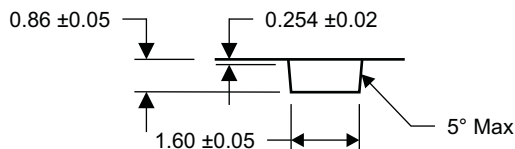
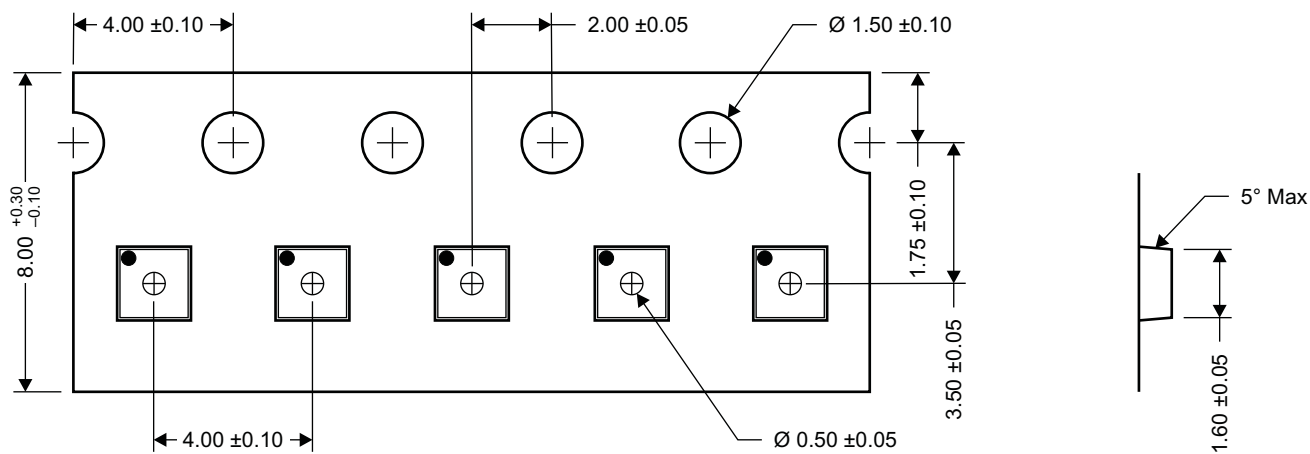
Recommended Land Pattern



M0172-01

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

Tape and Reel Information



M0173-01

- NOTES:
1. 10-sprocket hole-pitch cumulative tolerance ± 0.2
 2. Camber not to exceed 1mm in 100mm, noncumulative over 250mm
 3. Material: black static-dissipative polystyrene
 4. All dimensions are in mm (unless otherwise specified)
 5. Thickness: 0.30 ± 0.05 mm
 6. MSL1 260°C (IR and convection) PbF reflow compatible

REVISION HISTORY

Changes from Original (June 2010) to Revision A	Page
• Changed the C_{ISS} Input Capacitance Typ and Max Values From: 390 and 510 pF To: 490 and 640 pF	2

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