

Dual P-Channel NexFET™ Power MOSFET

Check for Samples: [CSD75204W15](#)

FEATURES

- Dual P-Ch MOSFETs
- Common Source Configuration
- Small Footprint 1.5-mm × 1.5-mm
- Gate-Source Voltage Clamp
- Gate ESD Protection –3kV
- Pb Free
- RoHS Compliant
- Halogen Free

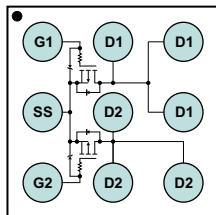
APPLICATIONS

- 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.

Top View



P0109-01

PRODUCT SUMMARY

V_{D1D2}	Drain to Drain Voltage	–20	V
Q_g	Gate Charge Total (–4.5V)	2.8	nC
Q_{gd}	Gate Charge Gate to Drain	0.6	nC
$R_{D1D2(on)}$	Drain to Drain On Resistance	$V_{GS} = -1.8V$	140 mΩ
		$V_{GS} = -2.5V$	105 mΩ
		$V_{GS} = -4.5V$	80 mΩ
$V_{GS(th)}$	Threshold Voltage	–0.7	V

ORDERING INFORMATION

Device	Package	Media	Qty	Ship
CSD75204W15	1.5-mm × 1.5-mm Wafer Level Package	7-Inch Reel	3000	Tape and Reel

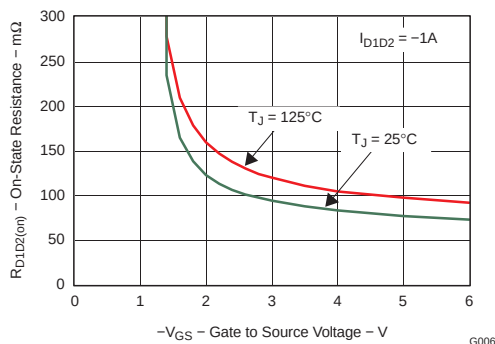
ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$ unless otherwise stated		VALUE	UNIT
V_{D1D2}	Drain to Drain Voltage	–20	V
V_{GS}	Gate to Source Voltage	–6	V
I_{D1D2}	Continuous Drain to Drain Current, $T_C = 25^\circ\text{C}^{(1)}$	–3	A
	Pulsed Drain to Drain Current, $T_C = 25^\circ\text{C}^{(2)}$	–28	A
I_S	Continuous Source Pin Current	–1.2	A
	Pulsed Source Pin Current ⁽²⁾	–15	A
I_G	Continuous Gate Clamp Current	–0.5	A
	Pulsed Gate Clamp Current ⁽²⁾	–7	A
P_D	Power Dissipation ⁽¹⁾	0.7	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	–55 to 150	$^\circ\text{C}$

(1) Per device, both sides in conduction

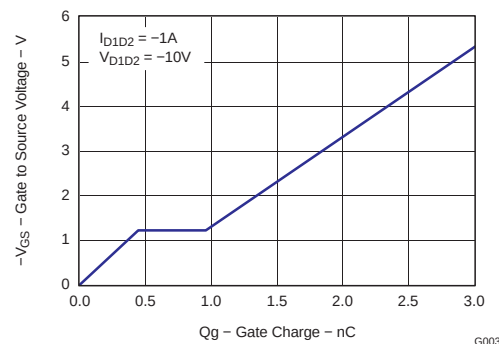
(2) Pulse duration 10μs, duty cycle ≤2%

$R_{D1D2(on)}$ vs V_{GS}



G006

Gate Charge (Per MOSFET)



G003



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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). Specifications and graphs are Per MOSFET unless otherwise stated. Drain to Drain measurements are done with both MOSFETs in series (common source configuration).

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Static Characteristics						
BV _{D1D2}	Drain to Drain Voltage	V _{GS} = 0V, I _{D1D2} = −250μA	−20			V
BV _{GSS}	Gate to Source Voltage	V _{D1D2} = 0V, I _G = −250μA	-6.1		-7.2	V
I _{DDs}	Drain to Drain Leakage Current	V _{GS} = 0V, V _{D1D2} = −16V			−1	μA
I _{GSS}	Gate to Source Leakage Current	V _{D1D2} = 0V, V _{GS} = -6V			−100	nA
V _{GS(th)}	Gate to Source Threshold Voltage	V _{D1D2} = V _{GS} , I _{DS} = −250μA	−0.5	−0.7	−0.9	V
R _{D1D2(on)}	Drain to Drain On Resistance	V _{GS} = −1.8V, I _{D1D2} = −1A	140		175	mΩ
		V _{GS} = −2.5V, I _{D1D2} = −1A	105		130	mΩ
		V _{GS} = −4.5V, I _{D1D2} = −1A	80		100	mΩ
g _{fs}	Transconductance	V _{D1D2} = −10V, I _{D1D2} = −1A	5.3			S
Dynamic Characteristics						
C _{iSS}	Input Capacitance	V _{GS} = 0V, V _{D1D2} = −10V, f = 1MHz	315		410	pF
C _{oSS}	Output Capacitance		128		165	pF
C _{rSS}	Reverse Transfer Capacitance		43		55	pF
Q _g	Gate Charge Total (−4.5V)	V _{D1D2} = −10V, I _{D1D2} = −1A	2.8		3.9	nC
Q _{gd}	Gate Charge - Gate to Drain		0.6			nC
Q _{gs}	Gate Charge - Gate to Source		0.5			nC
Q _{g(th)}	Gate Charge at V _{th}		0.2			nC
Q _{oSS}	Output Charge	V _{D1D2} = −9.5V, V _{GS} = 0V	2.2			nC
t _{d(on)}	Turn On Delay Time	V _{D1D2} = −10V, V _{GS} = −4.5V, I _{D1D2} = −1A, R _G = 30Ω	7.8			ns
t _r	Rise Time		6.7			ns
t _{d(off)}	Turn Off Delay Time		45			ns
t _f	Fall Time		26			ns
Diode Characteristics						
V _{SD}	Diode Forward Voltage	I _{D1D2} = −1A, V _{GS} = 0V	0.75		1	V
Q _{rr}	Reverse Recovery Charge	V _{dd} = −9.5V, I _F = −1A, di/dt = 200A/μs	10.5			nC
t _{rr}	Reverse Recovery Time	V _{dd} = −9.5V, I _F = −1A, di/dt = 200A/μs	23			ns

THERMAL CHARACTERISTICS

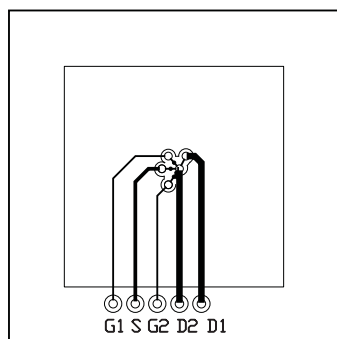
($T_A = 25^\circ\text{C}$ unless otherwise stated)

PARAMETER		MIN	TYP	MAX	UNIT
$R_{\theta JA}$	Thermal Resistance Junction to Ambient ^{(1) (2)}			200	$^\circ\text{C/W}$
	Thermal Resistance Junction to Ambient ^{(3) (2)}			94	$^\circ\text{C/W}$

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

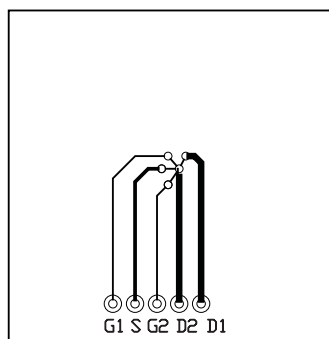
(2) Measured with both devices biased in a parallel condition.

(3) Device mounted on FR4 material with 1-inch² of Cu (2oz).



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Max $R_{\theta JA} = 94^{\circ}\text{C/W}$
when mounted on
1 inch² (6.45 cm²) of
2-oz. (0.071-mm thick)
Cu.

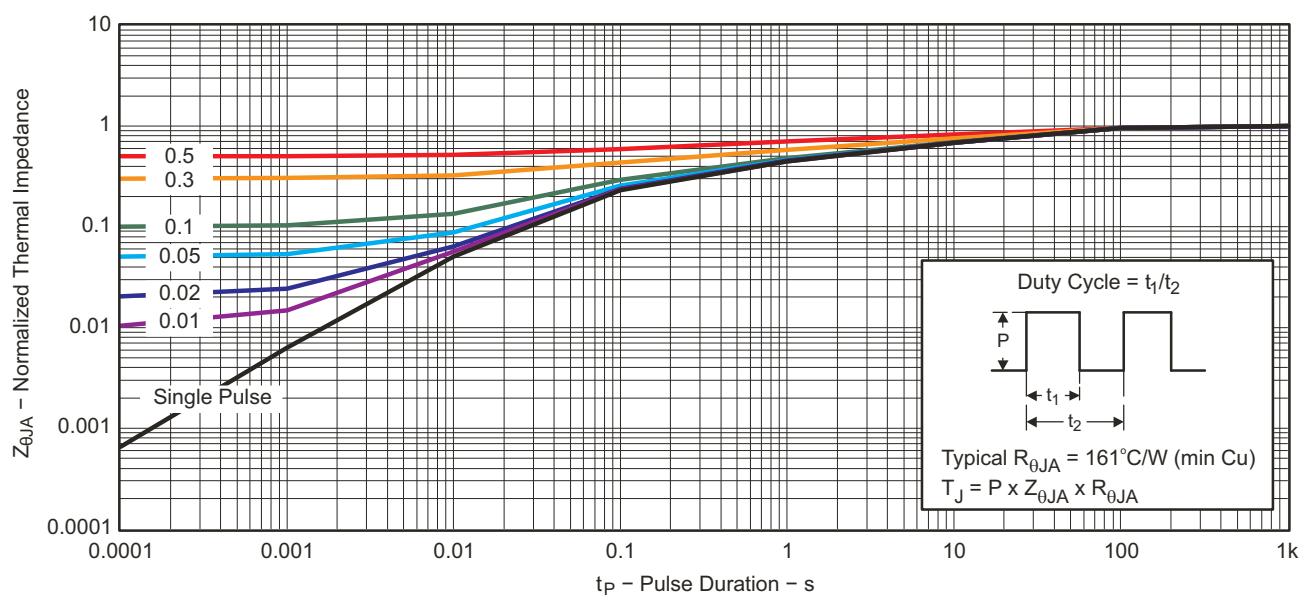


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Max $R_{\theta JA} = 200^{\circ}\text{C/W}$
when mounted on
minimum pad area of
2-oz. (0.071-mm thick)
Cu.

TYPICAL MOSFET CHARACTERISTICS

Graphs are Per MOSFET at $T_A = 25^{\circ}\text{C}$, unless stated otherwise. Drain to Drain measurements are done with both MOSFETs in series (common source configuration).



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Figure 1. Transient Thermal Impedance

TYPICAL MOSFET CHARACTERISTICS (continued)

Graphs are Per MOSFET at $T_A = 25^\circ\text{C}$, unless stated otherwise. Drain to Drain measurements are done with both MOSFETs in series (common source configuration).

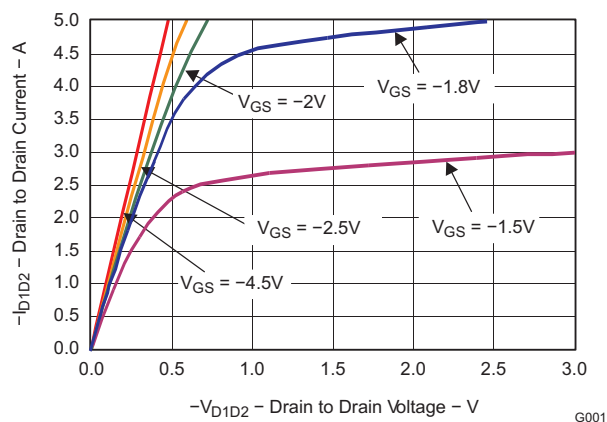


Figure 2. Saturation Characteristics

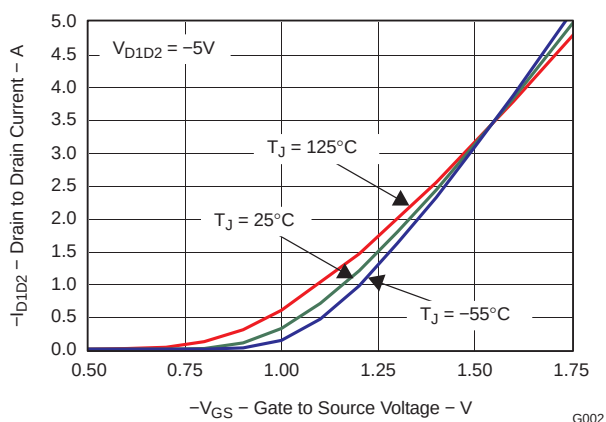


Figure 3. Transfer Characteristics

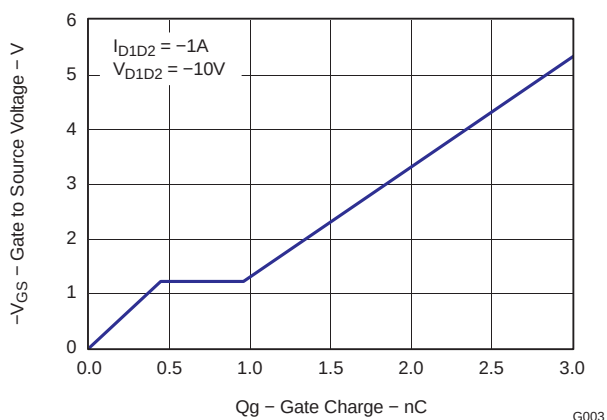


Figure 4. Gate Charge

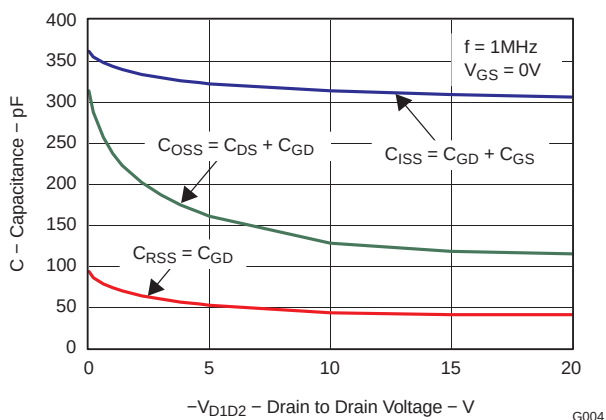


Figure 5. Capacitance

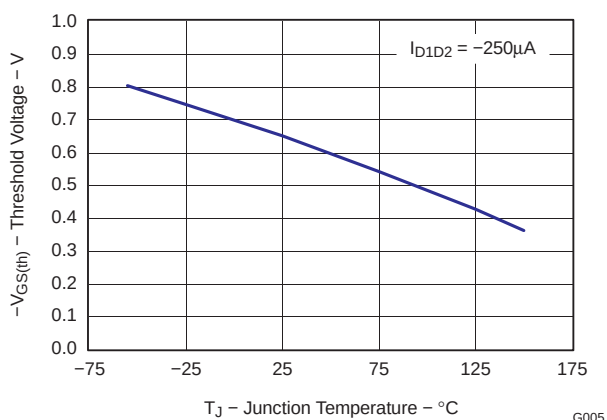


Figure 6. Threshold Voltage vs. Temperature

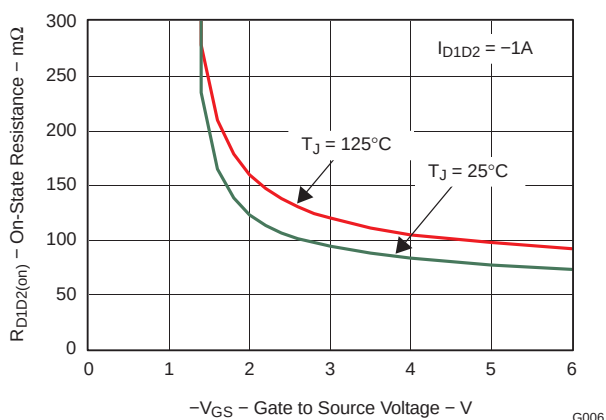


Figure 7. On-State Resistance vs. Gate to Source Voltage

TYPICAL MOSFET CHARACTERISTICS (continued)

Graphs are Per MOSFET at $T_A = 25^\circ\text{C}$, unless stated otherwise. Drain to Drain measurements are done with both MOSFETs in series (common source configuration).

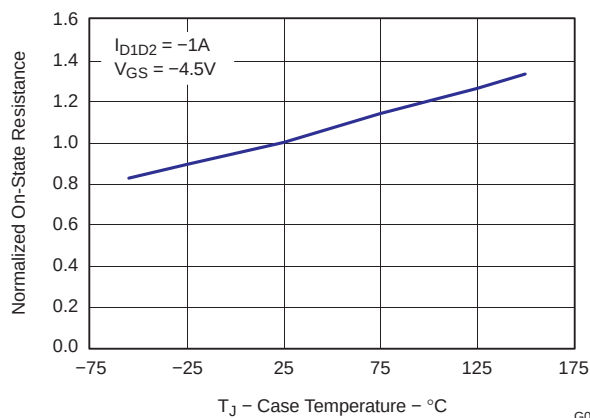


Figure 8. Normalized On-State Resistance vs. Temperature

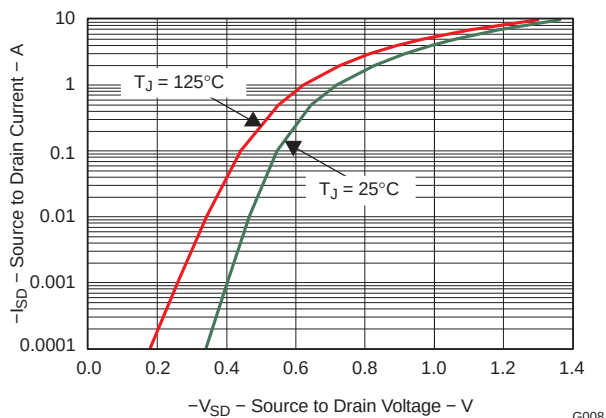


Figure 9. Typical Diode Forward Voltage

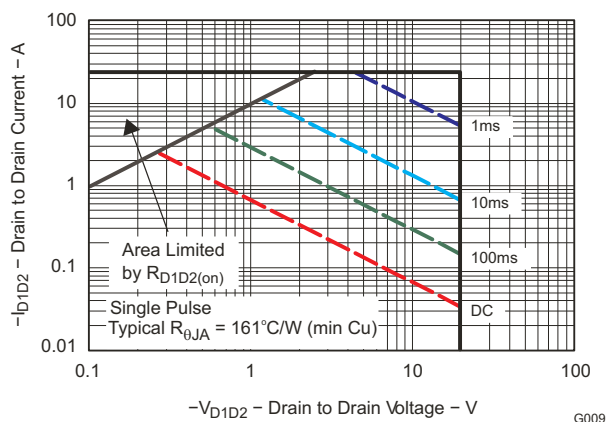


Figure 10. Maximum Safe Operating Area

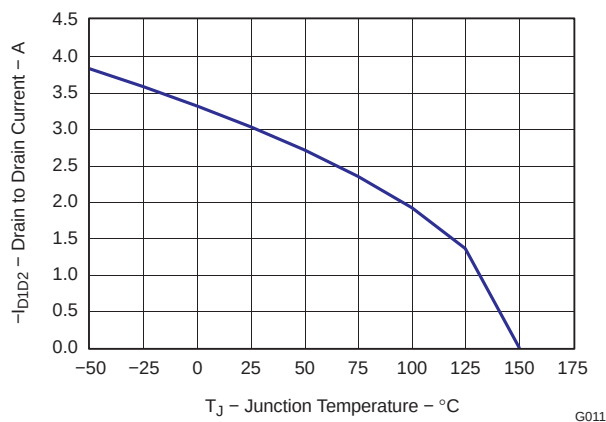
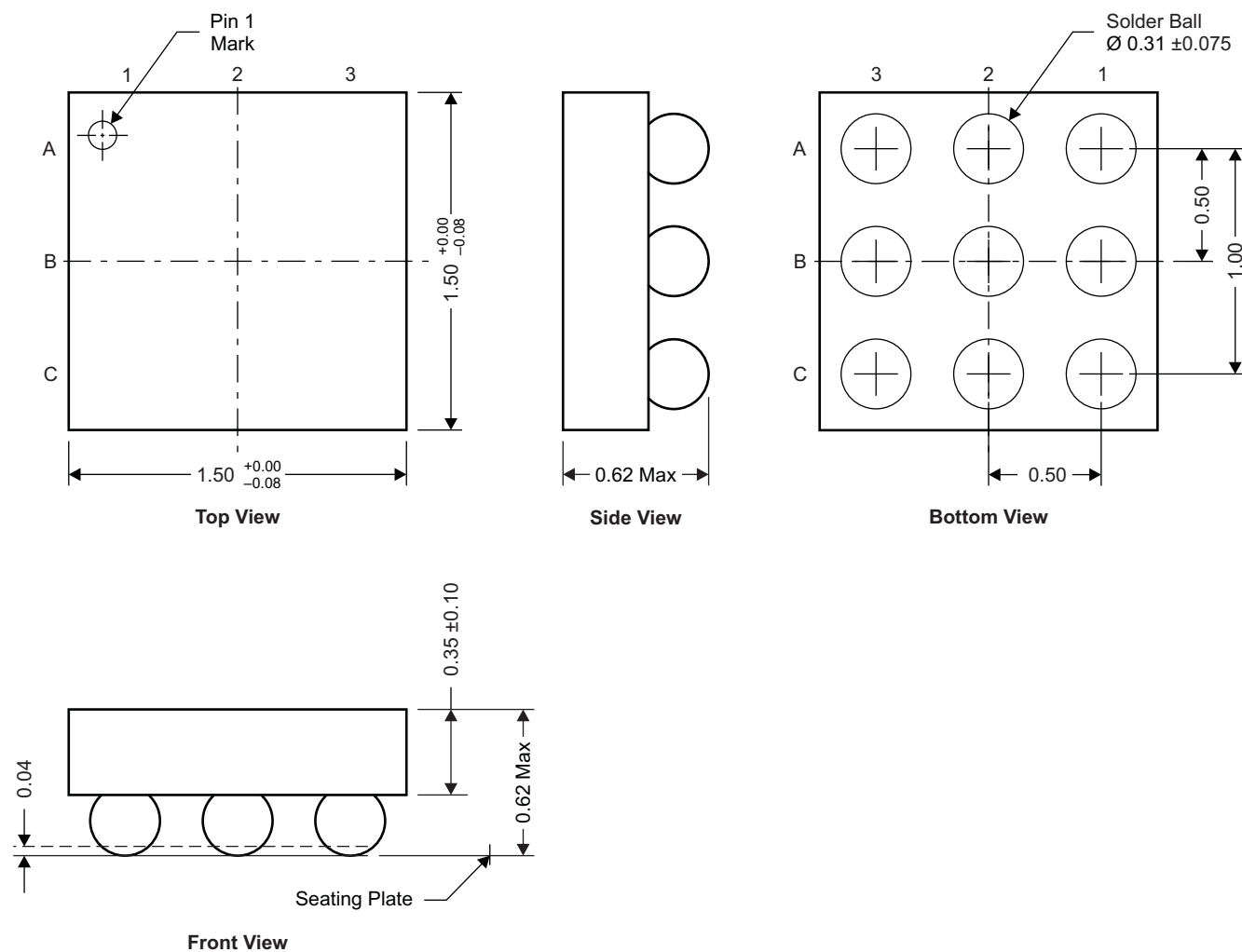


Figure 11. Maximum Drain Current vs. Temperature

MECHANICAL DATA

CSD75204W15 Package Dimensions



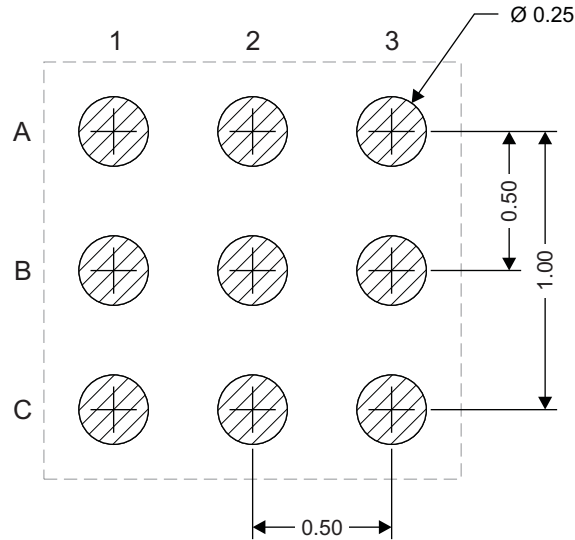
NOTE: All dimensions are in mm (unless otherwise specified)

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Pinout

POSITION	DESIGNATION
A1	Gate1
A2, A3, B3	Drain1
C1	Gate2
C2, C3, B2	Drain2
B1	Source Sense

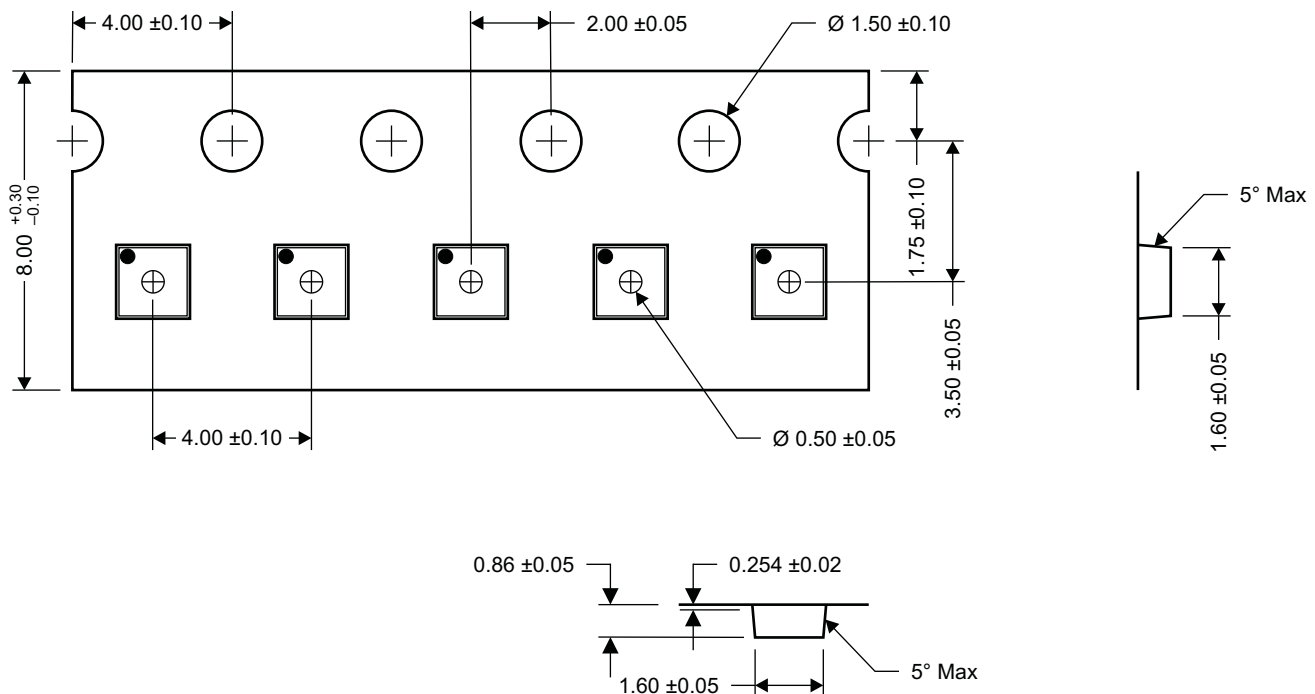
Land Pattern Recommendation



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

Tape and Reel Information



M0173-01

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

REVISION HISTORY

Changes from Original (October 2009) to Revision A	Page
• Deleted the Package Marking Information section	7

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