Dual N-Channel NexFET™ Power MOSFET

Check for Samples: CSD86311W1723

FEATURES

- **Dual N-Ch MOSFETs**
- **Common Source Configuration**
- **Small Footprint 1.7 mm × 2.3 mm**
- **Ultra Low Q_g and Q_{gd}**
- **Pb Free**
- **RoHS Compliant**
- **Halogen Free**

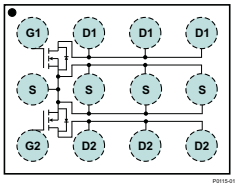
APPLICATIONS

- **Battery Management**
- **Battery Protection**
- **DC-DC Converters**

DESCRIPTION

The device has been designed to deliver the lowest on resistance and gate charge in the smallest outline possible with thermal characteristics in an ultra low profile. Low on resistance and gate charge coupled with the small footprint and low profile make the device ideal for battery operated space constrained application in load management as well as DC-DC converter applications

Top View



PRODUCT SUMMARY

V_{DS}	Drain to Source Voltage	25		V
Q_g	Gate Charge Total (4.5V)	3.1		nC
Q_{gd}	Gate Charge Gate to Drain	0.33		nC
$R_{DS(on)}$	Drain to Source On Resistance	V_{GS} = 2.5V	37	mΩ
		V_{GS} = 4.5V	31	mΩ
		V_{GS} = 8V	29	mΩ
$V_{GS(th)}$	Threshold Voltage	1		V

ORDERING INFORMATION

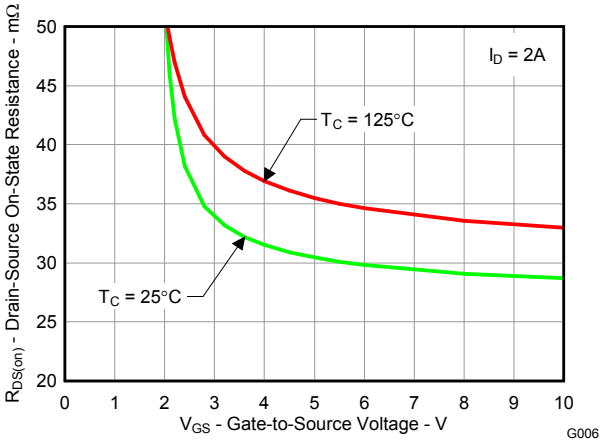
Device	Package	Media	Qty	Ship
CSD86311W1723	1.7-mm × 2.3-mm Wafer Level Package	7-inch reel	3000	Tape and Reel

ABSOLUTE MAXIMUM RATINGS

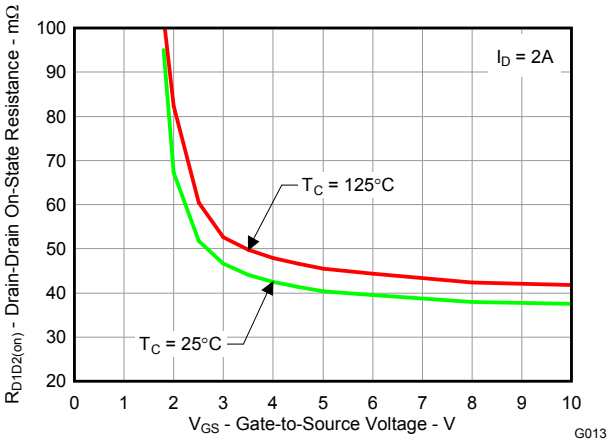
T_A = 25°C unless otherwise stated		VALUE	UNIT
V_{DS}	Drain to Source Voltage	25	V
V_{GS}	Gate to Source Voltage	+10 / -8	V
I_D	Continuous Drain Current (1) (2)(3)	4.5	A
	Pulsed Drain Current (1) (2)(3)		
I_G	Continuous Gate Clamp Current (4)	6	A
	Pulsed Gate Clamp Current (4)		
P_D	Power Dissipation (1)	1.5	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	–55 to 150	°C

(1) May be limited by Max source current
(2) Based on Min Cu footprint
(3) Per MOSFET
(4) Total for device

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



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



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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°C unless otherwise stated)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Static Characteristics						
BV_{DSS}	Drain to Source Voltage	V_{GS} = 0V, I_D = 250μA	25			V
I_{DSS}	Drain to Source Leakage Current	V_{GS} = 0V, V_{DS} = 20V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{DS} = 0V, V_{GS} = +10 / -8V			±100	nA
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	0.85	1	1.4	V
$R_{DS(on)}$	Drain to Source On Resistance	V_{GS} = 2.5V, I_{DS} = 2A		37	51	mΩ
		V_{GS} = 4.5V, I_{DS} = 2A		31	42	mΩ
		V_{GS} = 8V, I_{DS} = 2A		29	39	mΩ
$R_{DD(on)}$	Drain to Drain On Resistance	V_{GS} = 2.5V, I_D = 2A		52	75	mΩ
		V_{GS} = 4.5V, I_{DS} = 2A		41	55	mΩ
		V_{GS} = 8V, I_{DS} = 2A		38	50	mΩ
g_{fs}	Transconductance	V_{DS} = 10V, I_D = 2A		6.4		S
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V, V_{DS} = 12.5V, f = 1MHz		450	585	pF
C_{OSS}	Output Capacitance			250	325	pF
C_{RSS}	Reverse Transfer Capacitance			10	13	pF
R_G	Seried Gate Resistance			1.4	2.8	Ω
Q_g	Gate Charge Total (4.5V)	V_{DS} = 12.5V, I_D = 2A		3.1	4	nC
Q_{gd}	Gate Charge Gate to Drain			0.33		nC
Q_{gs}	Gate Charge Gate to Source			0.85		nC
$Q_{g(th)}$	Gate Charge at Vth			0.48		nC
Q_{OSS}	Output Charge	V_{DS} = 12.2V, V_{GS} = 0V		4.5		nC
$t_{d(on)}$	Turn On Delay Time	V_{DS} = 12.5V, V_{GS} = 4.5V, I_D = 2A, R_G = 2Ω		5.4		ns
t_r	Rise Time			4.3		ns
$t_{d(off)}$	Turn Off Delay Time			13.2		ns
t_f	Fall Time			2.9		ns
Diode Characteristics						
V_{SD}	Diode Forward Voltage	I_S = 2A, V_{GS} = 0V		0.78	1	V
Q_{rr}	Reverse Recovery Charge	V_{dd}= 12.2V, I_F = 2A, di/dt = 300A/μs		4.2		nC
t_{rr}	Reverse Recovery Time			13.4		ns

THERMAL CHARACTERISTICS

(T_A = 25°C unless otherwise stated)

PARAMETER		MIN	TYP	MAX	UNIT
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (Minimum Cu area) (1) (2)			165	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (1 in^2 Cu area) (2) (3)			68	°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 in^2 of 2oz. Cu.

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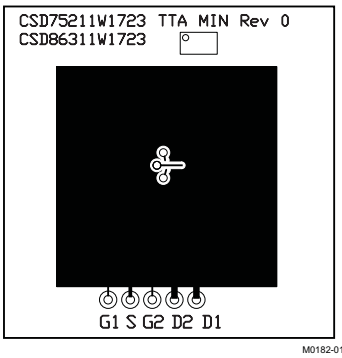
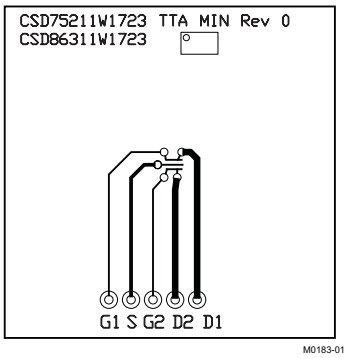


Max $R_{\theta JA}$ = 68°C/W when mounted on 1inch^2 of 2 oz. Cu.



Max $R_{\theta JA}$ = 165°C/W when mounted on minimum pad area of 2 oz. Cu.

TYPICAL MOSFET CHARACTERISTICS

(T_A = 25°C unless otherwise stated)

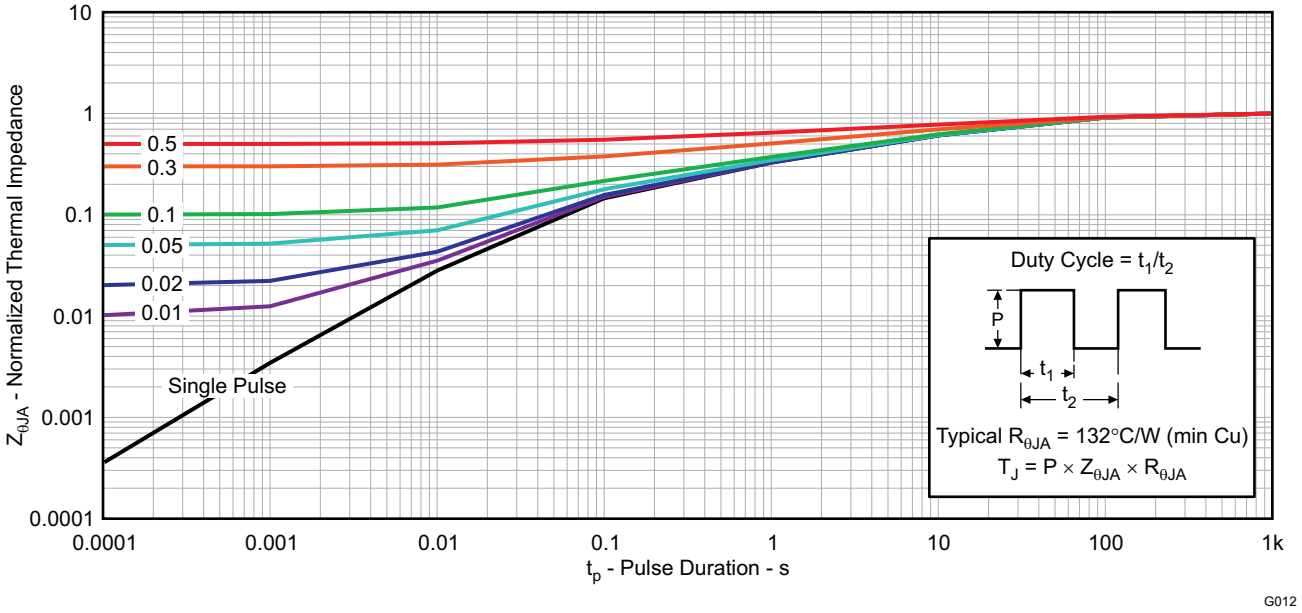


Figure 1. Transient Thermal Impedance

TYPICAL MOSFET CHARACTERISTICS (continued)

(T_A = 25°C unless otherwise stated)

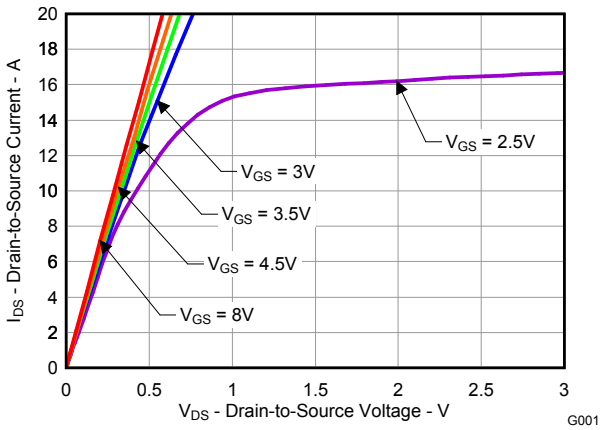


Figure 2. Saturation Characteristics

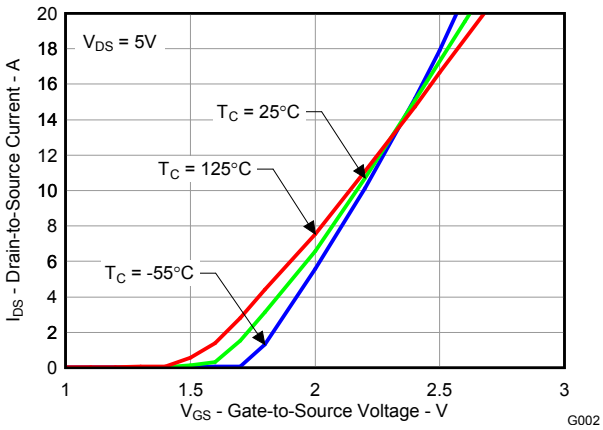


Figure 3. Transfer Characteristics

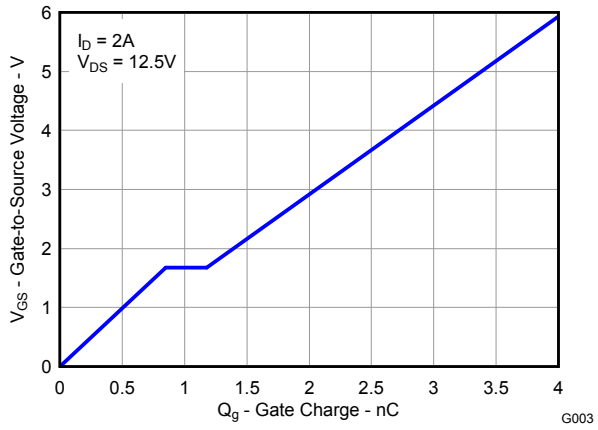


Figure 4. Gate Charge

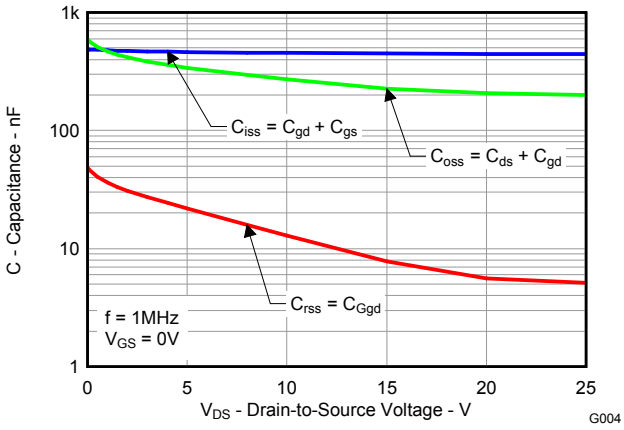


Figure 5. Capacitance

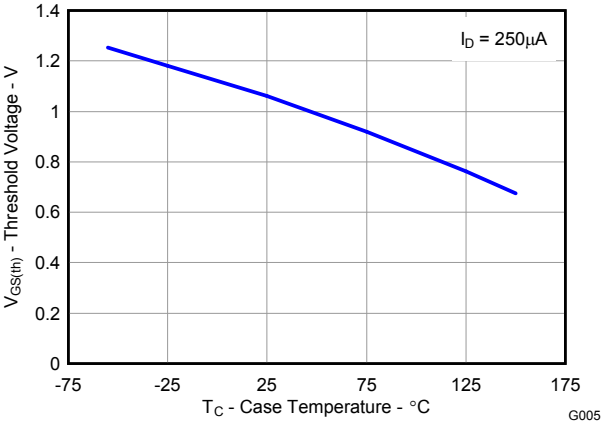


Figure 6. Threshold Voltage vs. Temperature

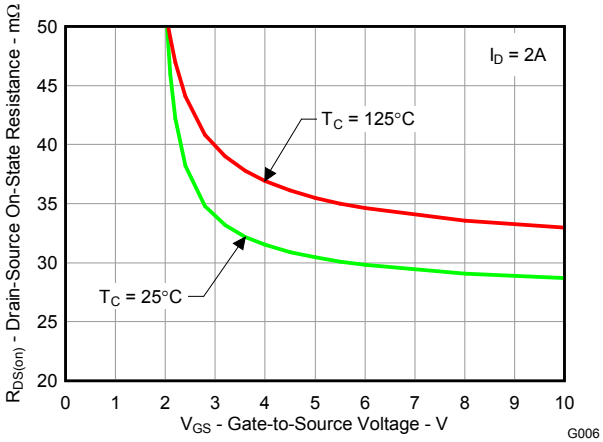


Figure 7. $R_{DS(on)}$ vs. Gate-to-Source Voltage

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TYPICAL MOSFET CHARACTERISTICS (continued)

(T_A = 25°C unless otherwise stated)

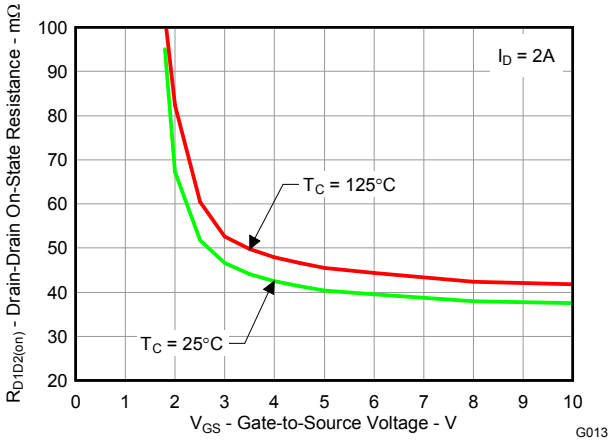


Figure 8. $R_{D1D2(on)}$ vs. Gate-to-Source Voltage

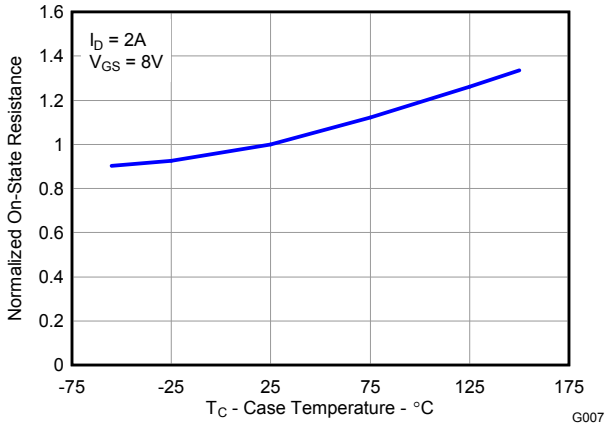


Figure 9. On Resistance vs. Temperature

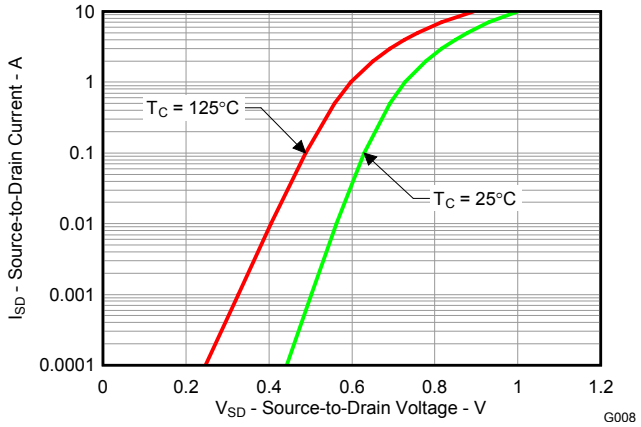


Figure 10. Typical Diode Forward Voltage

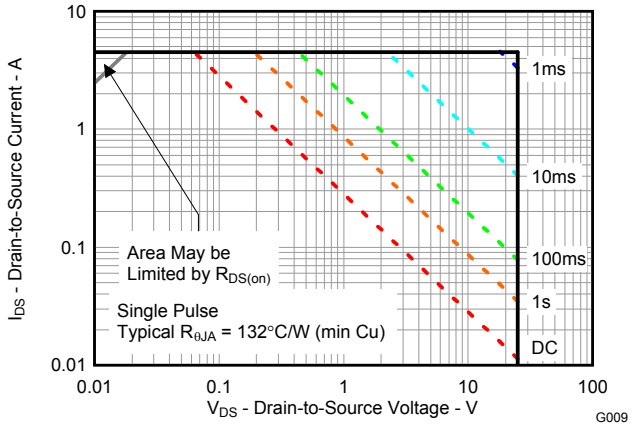


Figure 11. Maximum Safe Operating Area

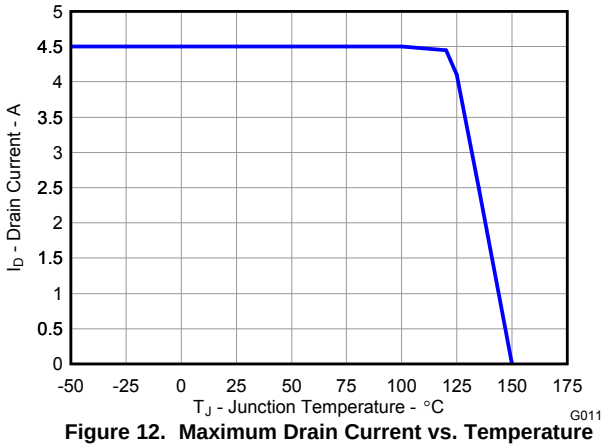
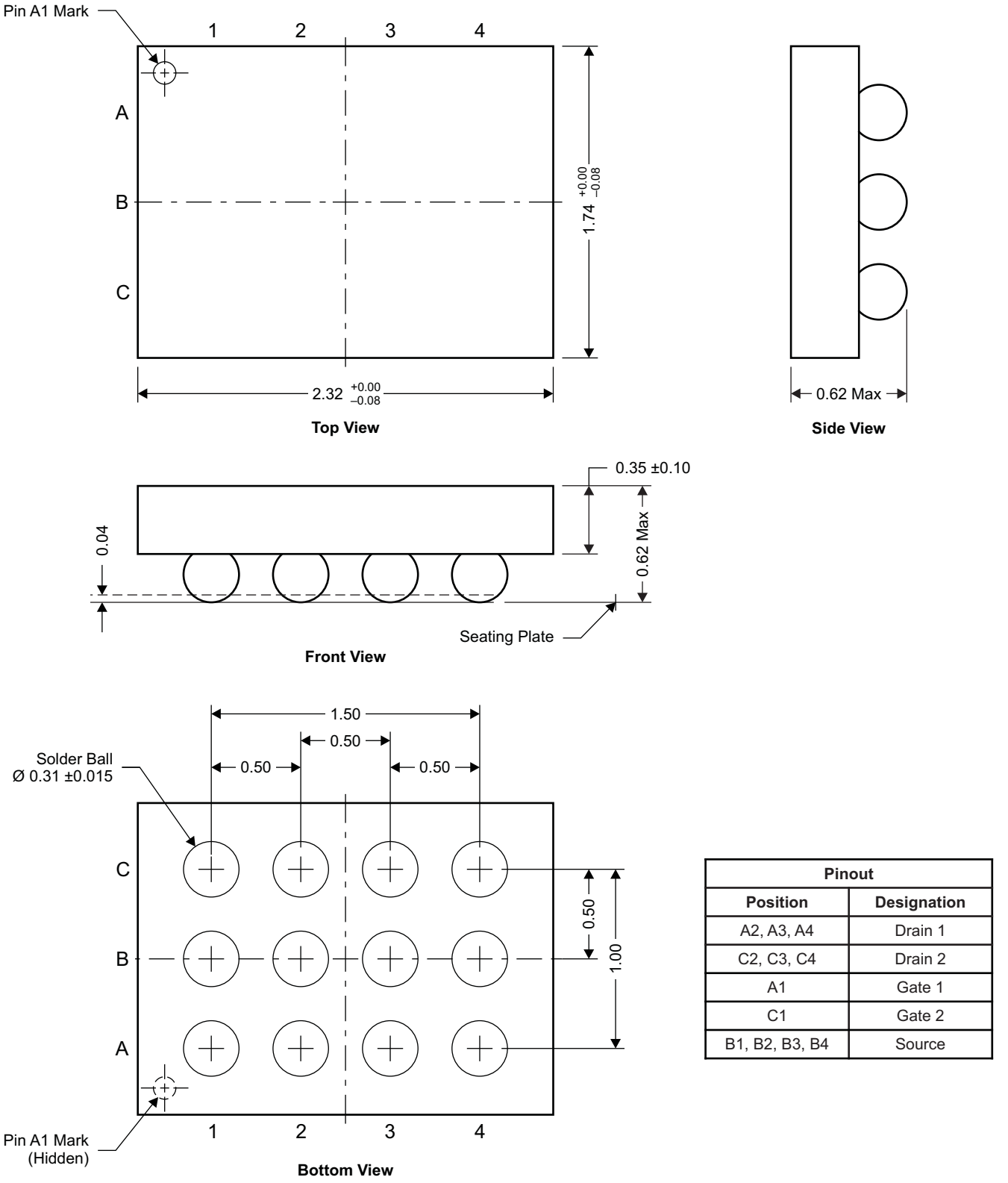


Figure 12. Maximum Drain Current vs. Temperature

MECHANICAL DATA

CSD86311W1723 Package Dimensions



Pinout	
Position	**Designation**
A2, A3, A4	Drain 1
C2, C3, C4	Drain 2
A1	Gate 1
C1	Gate 2
B1, B2, B3, B4	Source

M0184-01

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

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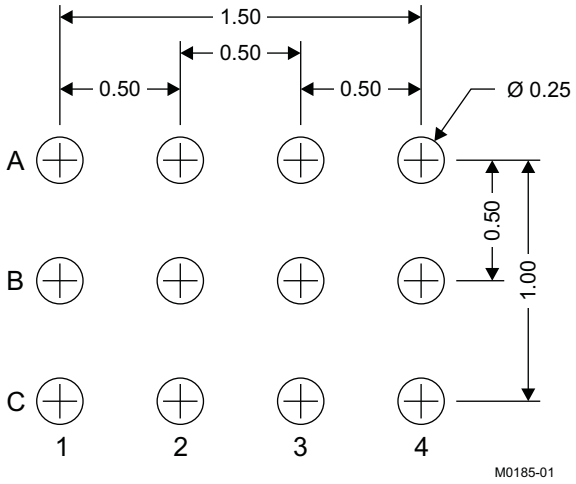
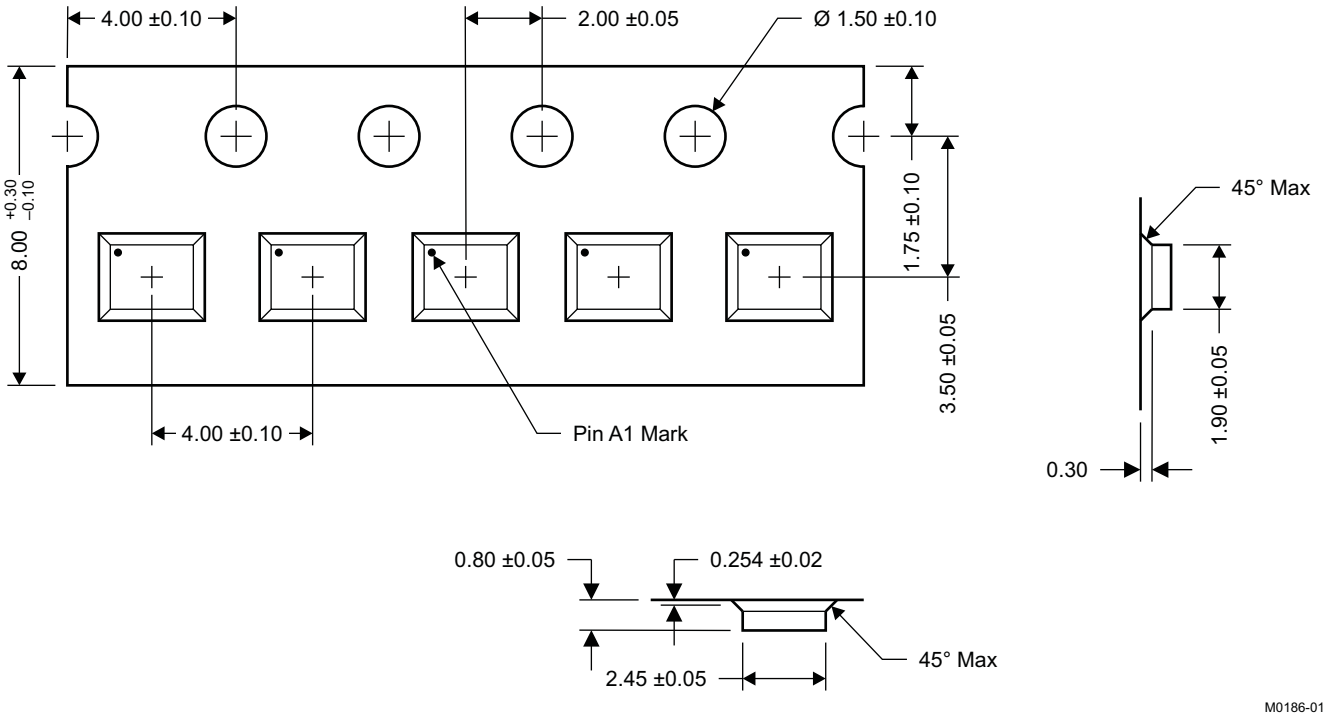
Land Pattern Recommendation



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

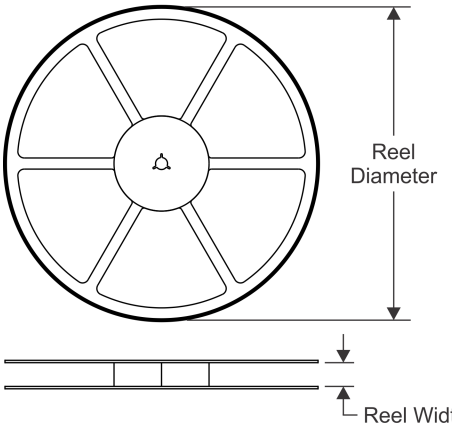
Tape and Reel Information



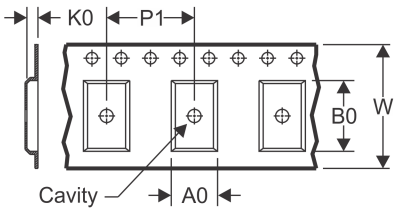
NOTE: All dimensions are in mm (unless otherwise specified)

TAPE AND REEL INFORMATION

REEL DIMENSIONS

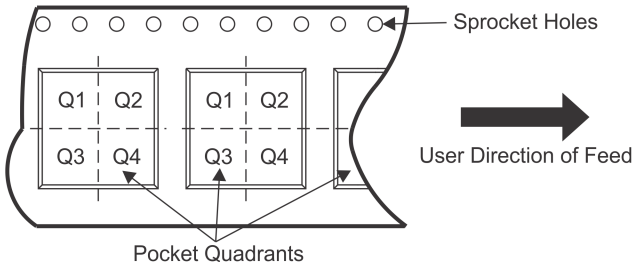


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

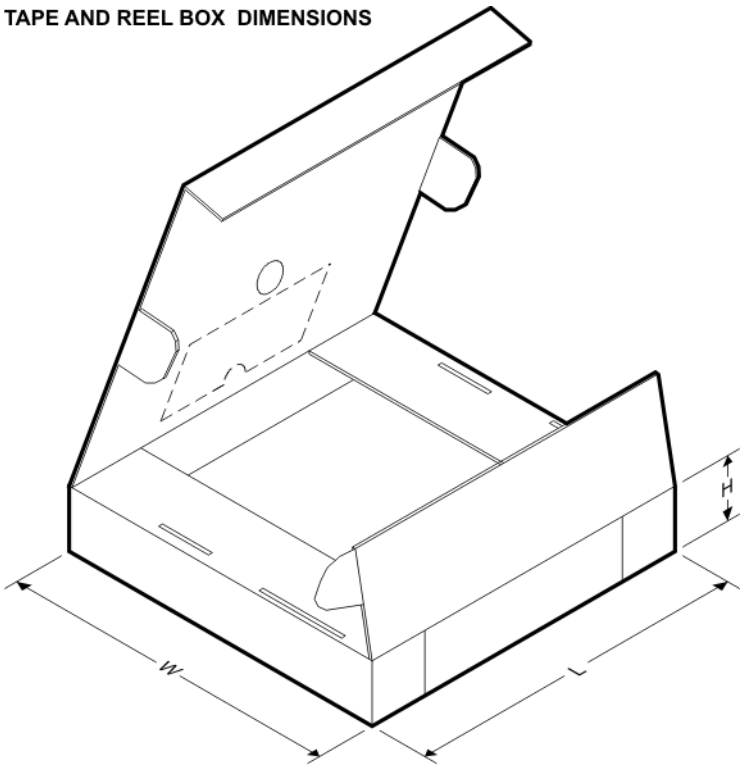
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CSD86311W1723	DSBGA	YZG	12	3000	180.0	8.4	2.38	1.8	0.69	4.0	8.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CSD86311W1723	DSBGA	YZG	12	3000	182.0	182.0	17.0

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