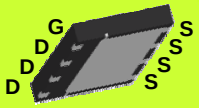
P-Channel

CICLON NexFET™ Power MOSFETs

CSD25401Q3

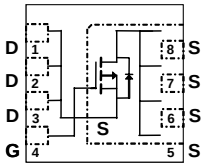
Features

- Ultra Low Qg & Qgd
- Low Thermal Resistance
- Low Rdson
- Pb Free Terminal Plating
- RoHS Compliant
- Halogen Free



QFN 3.3mm x 3.3mm

Plastic Package



Top View

Product Summary

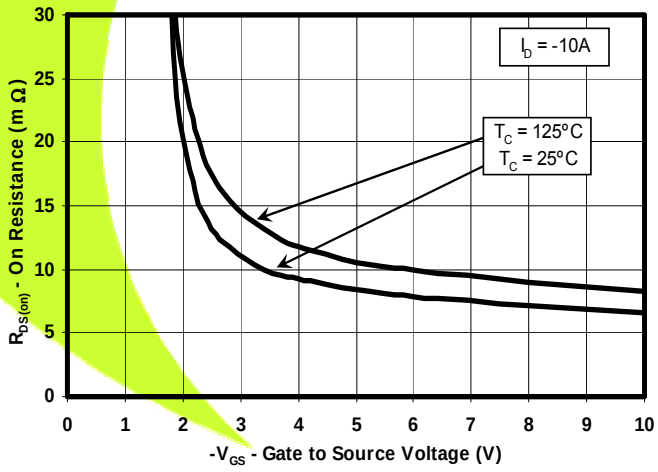
V_{DS}	-20		V
Q_g	8.8		nC
Q_{gd}	2.1		nC
$R_{DS(on)}$	V_{GS} = -2.5V	13.5	mΩ
	V_{GS} = -4.5V	8.7	mΩ
V_{th}	-0.85		V

Maximum Values (T_A = 25°C unless otherwise stated)

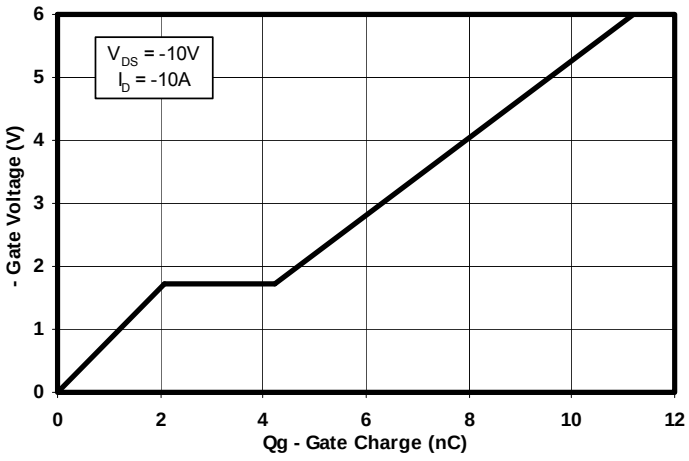
Symbol	Parameter	Value	Units
V_{DS}	Drain to Source Voltage	-20	V
V_{GS}	Gate to Source Voltage	+/-12V	V
I_D	Continuous Drain Current, T_C = 25°C	-60	A
	Continuous Drain Current[1]	-13.6	A
I_{DM}	Pulsed Drain Current, T_A = 25°C[2]	-82	A
P_D	Power Dissipation[1]	2.8	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	°C

1. Rθja = 45°C/W on 1in² Cu FR4 PCB.
2. Pulse width ≤300 µs, duty cycle ≤ 2%

$R_{DS(ON)}$ vs. V_{GS}



Gate Charge



Ordering Information

Type	Package	Package Media	Qty	Ship
CSD25401Q3	QFN 3.3 X 3.3 Plastic Package	13 inch reel	2500	Tape and Reel

P-Channel
CICLON NexFET™ Power MOSFETs
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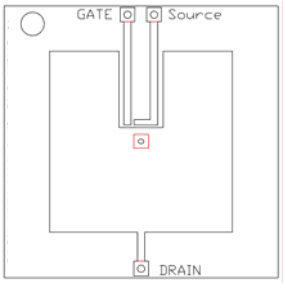
Electrical Characteristics (T_A = 25°C unless otherwise stated)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
BV_{DSS}	Drain to Source Voltage	V_{GS} = 0V, I_D = -250µA	-20	—	—	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} = +/-12V	—	—	-100	nA
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{DS} = V_{GS}, I_D = -250µA	-0.5	-0.85	-1.4	V
$R_{DS(on)}$	Drain to Source On Resistance	V_{GS} = -2.5V, I_D = -10A	—	13.5	18.5	mΩ
		V_{GS} = -4.5V, I_D = -10A	—	8.7	11.5	mΩ
g_{fs}	Transconductance	V_{DS} = -10V, I_D = -10A	—	43	—	S
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V, V_{DS} = -10V, f = 1MHz	—	1070	1400	pF
C_{OSS}	Output Capacitance		—	560	730	pF
C_{RSS}	Reverse Transfer Capacitance		—	180	230	pF
Q_g	Gate Charge Total (-4.5V)	V_{DS} = -10V, I_D = -10A	—	8.8	12.3	nC
Q_{gd}	Gate Charge Gate to Drain		—	2.1	—	nC
Q_{gs}	Gate Charge Gate to Source		—	2.1	—	nC
$Q_{g(th)}$	Gate Charge at Vth		—	0.9	—	nC
Q_{OSS}	Output Charge	V_{DS} = -10V, V_{GS} = 0V	—	8.2	—	nC
$t_{d(on)}$	Turn On Delay Time	V_{DS} = -10V, V_{GS} = -4.5V I_D = -10A, R_G = 5.1Ω	—	8.1	—	ns
t_r	Rise Time		—	3.9	—	ns
$t_{d(off)}$	Turn Off Delay Time		—	13.5	—	ns
t_f	Fall Time		—	12.6	—	ns
Diode Characteristics						
V_{SD}	Diode Forward Voltage	I_S = -10A, V_{GS} = 0V	—	-0.81	-1.0	V
Q_{rr}	Reverse Recovery Charge	V_{dd}=-12.5V, I_F = -10A, di/dt = 300A/µs	—	17.4	—	nC
t_{rr}	Reverse Recovery Time	V_{dd}=-12.5V, I_F = -10A, di/dt = 300A/µs	—	21	—	ns

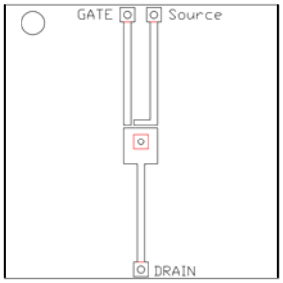
Thermal Characteristics (T_A = 25°C unless otherwise stated)

Symbol	Parameter	Min	Typ	Max	Units
Thermal Characteristics					
$R_{\theta JA}$	Thermal Resistance Junction to Case[3]	—	—	2.8	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient[3,4]	—	—	56	°C/W

3. $R_{\theta jc}$ is determined with the device mounted on a 1in square 2 oz. Cu pad on a 1.5x1.5 in .060in thick FR4 board. $R_{\theta jc}$ is guaranteed by design while $R_{\theta ca}$ is determined by the user's board design.
4. Device mounted on FR4 Material with 1in^2 of 2 oz. Cu.



Max Rθja =56 °C/W when mounted on 1in^2 of 2 oz. Cu.



Max Rθja =158 °C/W when mounted on min pad area of 2 oz. Cu.

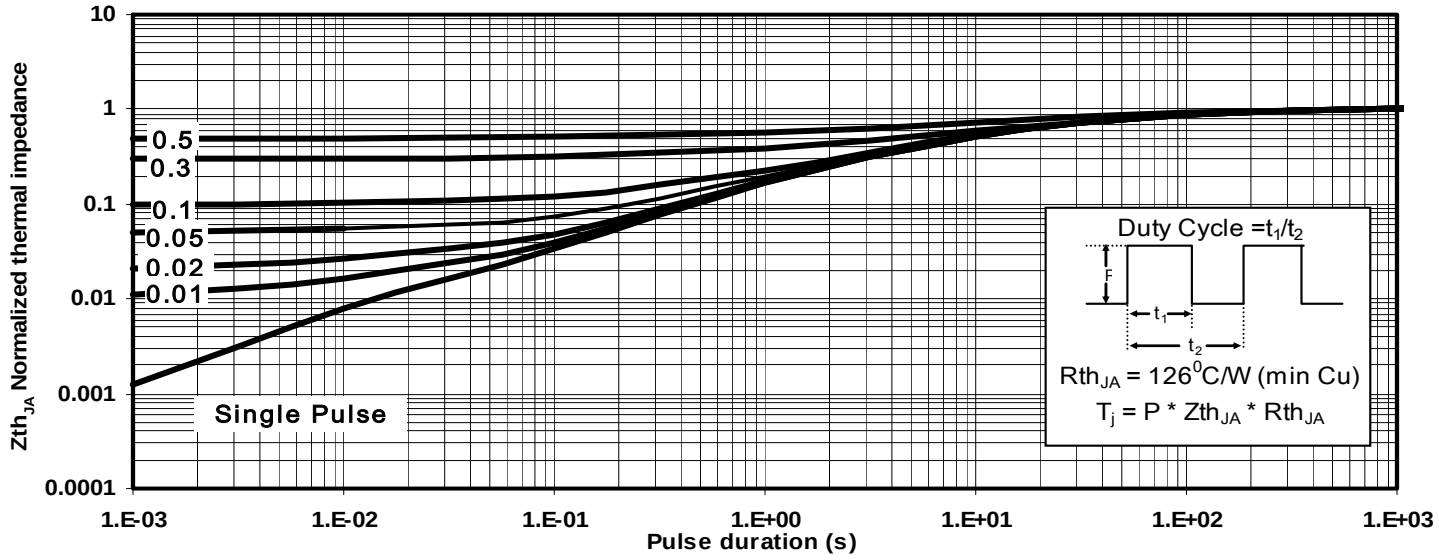


Figure 1: Transient Thermal Impedance

Typical MOSFET Characteristics (T_A = 25°C unless otherwise stated)

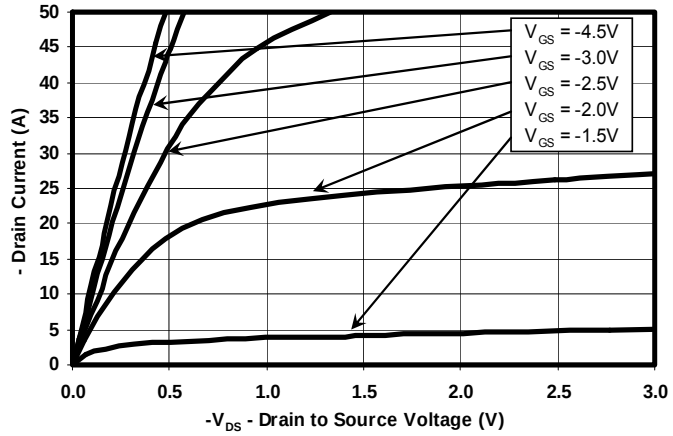


Figure 2: Saturation Characteristics

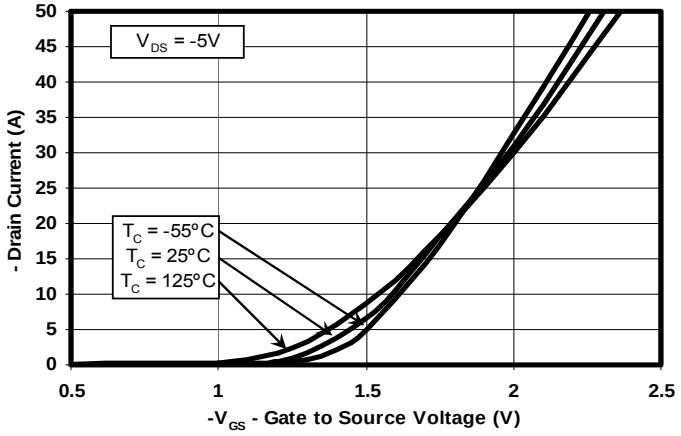


Figure 3: Transfer Characteristics

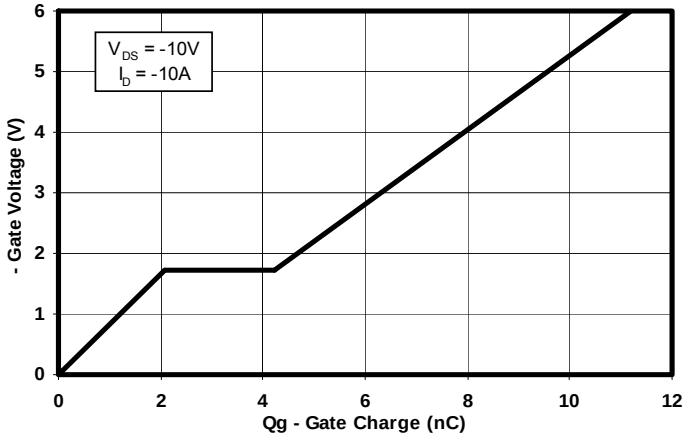


Figure 4: Gate Charge

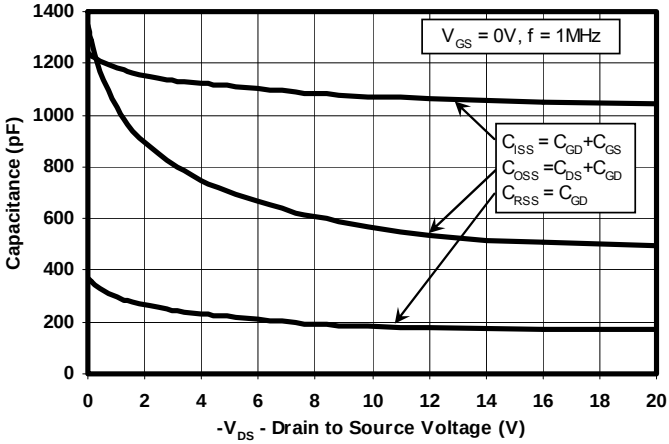


Figure 5: Capacitance

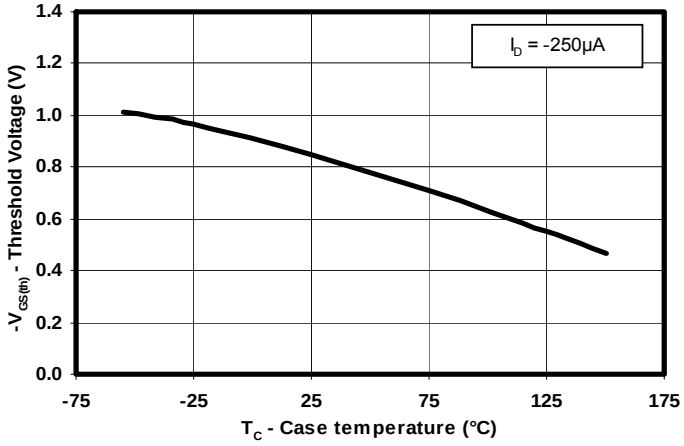


Figure 6: Threshold Voltage vs. Temperature

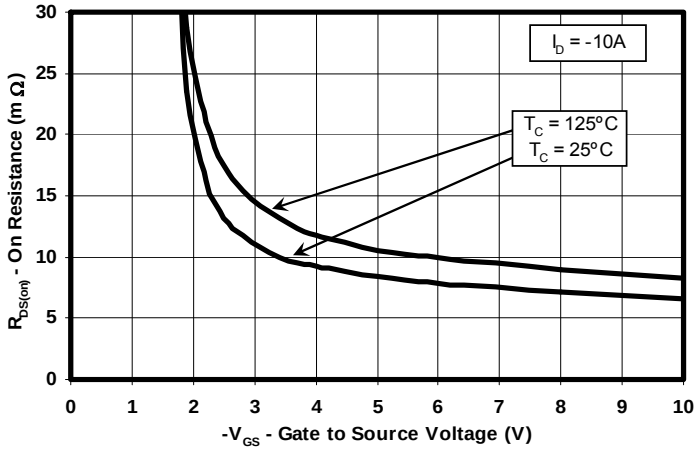


Figure 7: On Resistance vs. Gate Voltage

Typical MOSFET Characteristics (T_A = 25°C unless otherwise stated)

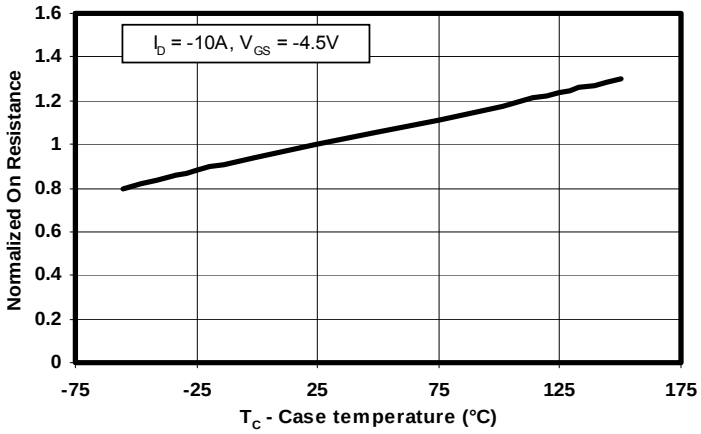


Figure 8: On Resistance vs. Temperature

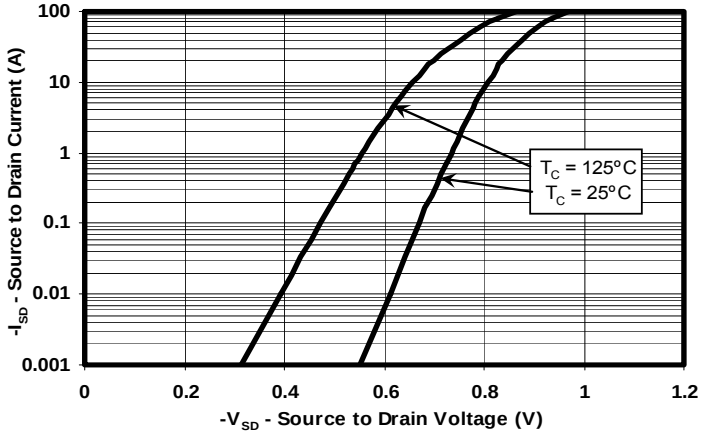


Figure 9: Typical Diode Forward Voltage

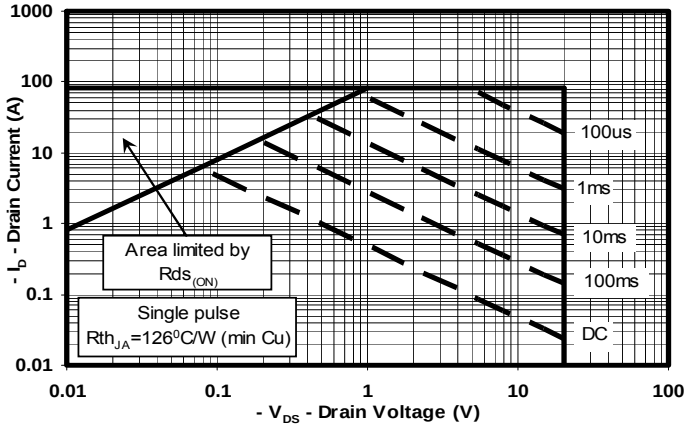


Figure 10: Maximum Safe Operating Area

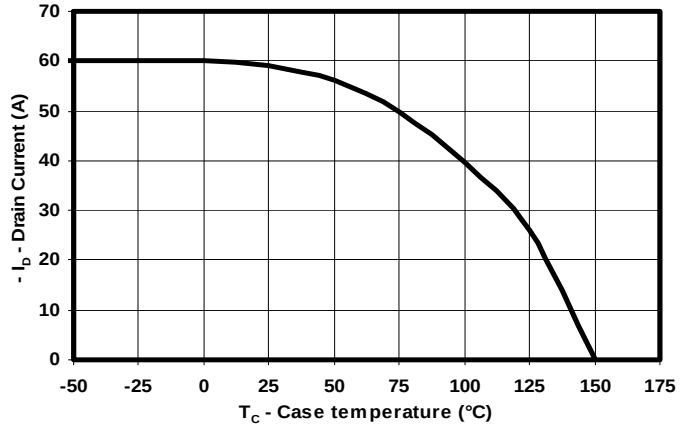


Figure 11: Maximum Drain Current vs. Temperature

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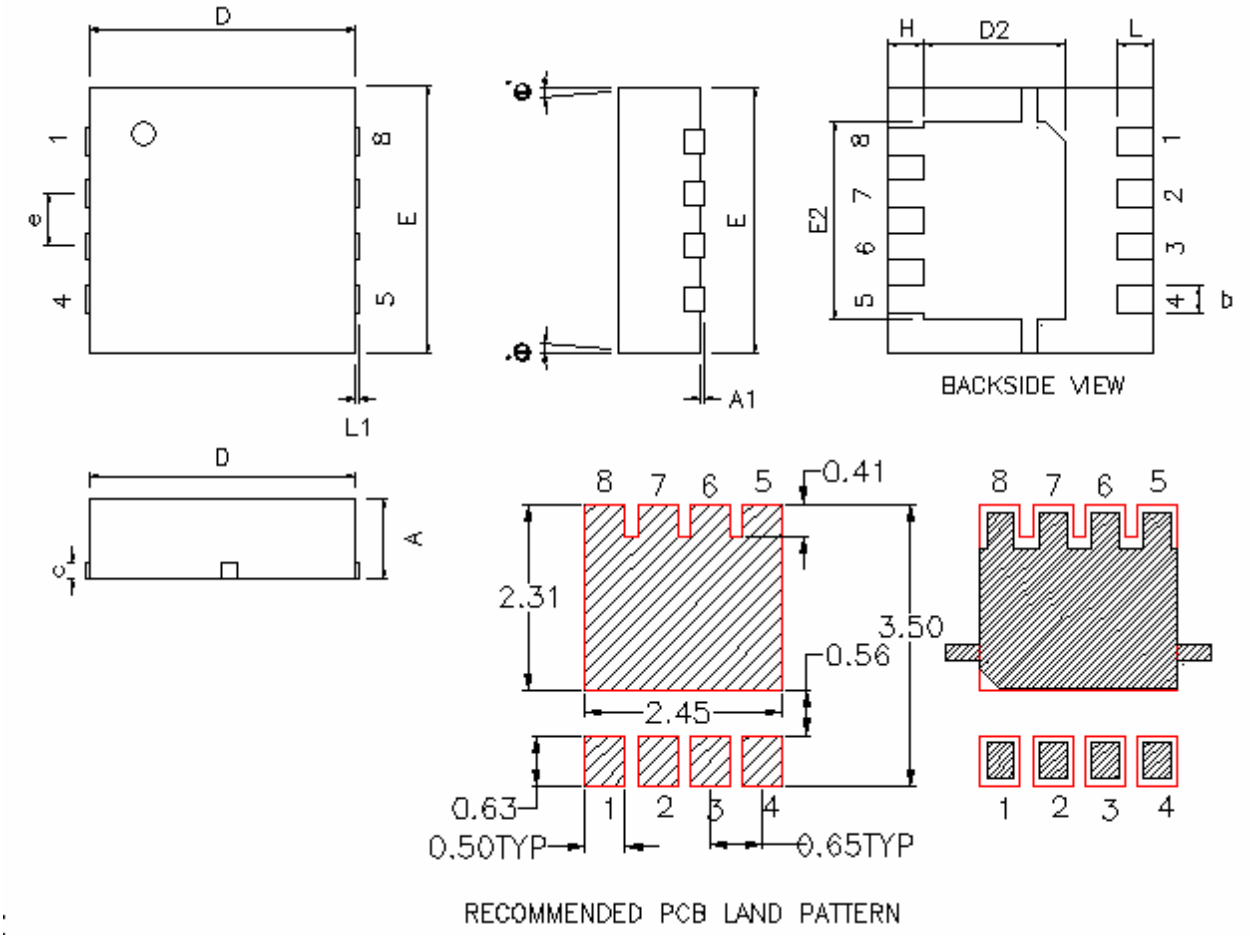
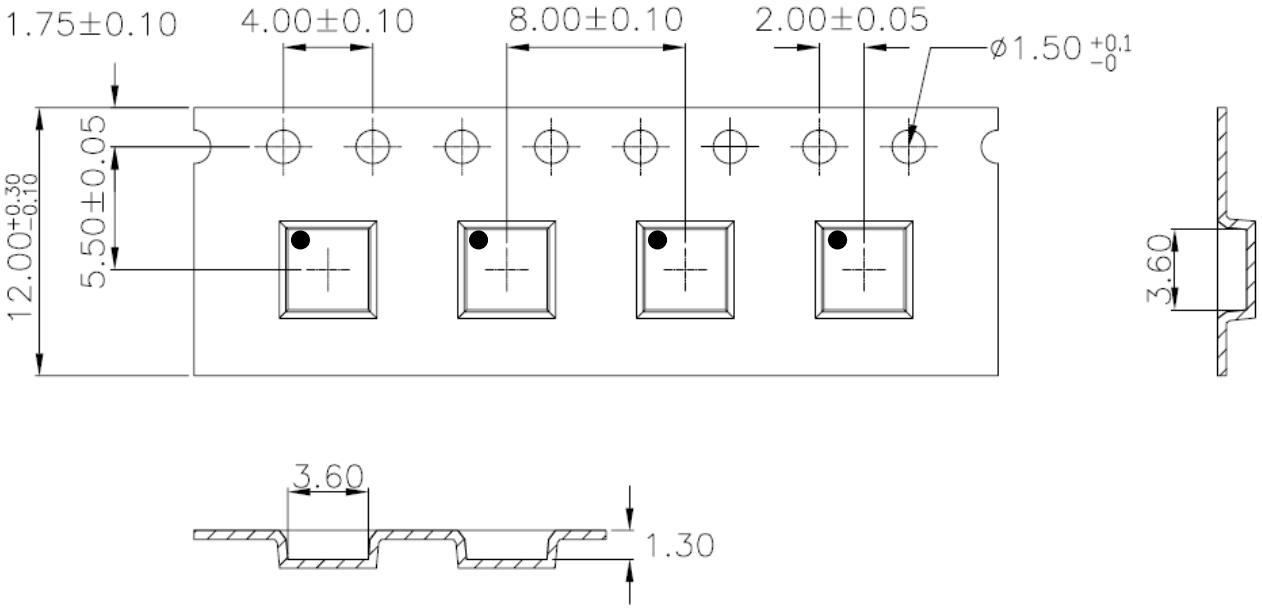
CSD25401Q3 Package Dimensions



DIM	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.950	1.000	1.100	0.037	0.039	0.043
A1	0.000	0.000	0.050	0.000	0.000	0.002
b	0.280	0.340	0.400	0.011	0.013	0.016
c	0.150	0.200	0.250	0.006	0.008	0.010
D	3.200	3.300	3.400	0.126	0.130	0.134
D1	-	-	-	-	-	-
D2	1.650	1.750	1.800	0.065	0.069	0.071
E	3.200	3.300	3.400	0.126	0.130	0.134
E1	-	-	-	-	-	-
E2	2.350	2.450	2.550	0.093	0.096	0.100
e	0.650 TYP			0.026		
H	0.35	0.450	0.550	0.014	0.018	0.022
L	0.35	0.450	0.550	0.014	0.018	0.022
L1	-	-	-	-	-	-
θ	-	-	-	-	-	-

Tape and Reel Information



Note:

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 +/-0.05mm

Package Marking Information

Location:

1st Line

CSD = Fixed Characters

NNNNN = Product Code

2nd Line (Date Code)

YY = Last 2 digits of the Year

WW = 2-digit Work Week

C = Country of Origin

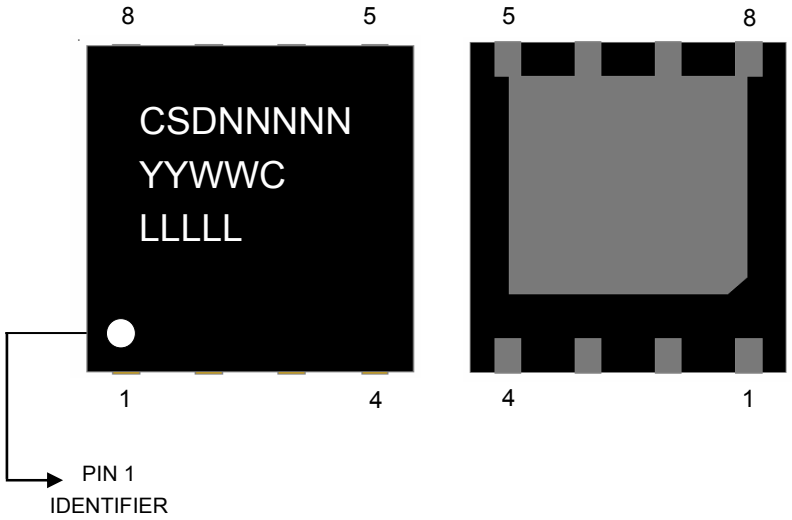
> Philippines = P

> Taiwan = T

> China = C

3rd Line

LLLLL= Last 5 digits of the Wafer Lot #



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CSD25401Q3

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CICLON Semiconductor Device Corp.
116 Research Drive, Bethlehem, PA 18015
T 610-849-5100 **F** 610-849-5101

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
CSD25401Q3	ACTIVE	SON	DQG	8	2500	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM

(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.

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