30V, N-Channel NexFET™ Power MOSFETs

Check for Samples: CSD17553Q5A

FEATURES

- **Ultralow Q_g and Q_{gd}**
- **Low Thermal Resistance**
- **Avalanche Rated**
- **Pb Free Terminal Plating**
- **RoHS Compliant**
- **Halogen Free**
- **SON 5-mm × 6-mm Plastic Package**

APPLICATIONS

- **Point of load Synchronous Buck in Networking, Telecom and Computing Systems**
- **Optimized for Control and Synchronous FET Applications**

DESCRIPTION

The NexFET power MOSFET has been designed to minimize losses in power conversion applications.

PRODUCT SUMMARY

V_{DS}	Drain to Source Voltage	30		V
Q_g	Gate Charge Total (4.5V)	17.5		nC
Q_{gd}	Gate Charge Gate to Drain	4.7		nC
$R_{DS(on)}$	Drain to Source On Resistance	V_{GS} = 4.5V	3.5	mΩ
		V_{GS} = 10V	2.7	mΩ
$V_{GS(th)}$	Threshold Voltage	1.5		V

ORDERING INFORMATION

Device	Package	Media	Qty	Ship
CSD17553Q5A	SON 5-mm × 6-mm Plastic Package	13-Inch Reel	2500	Tape and Reel

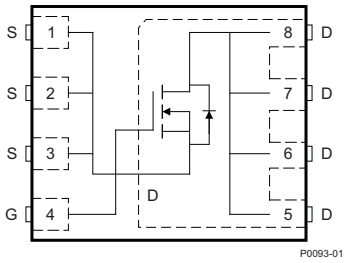
ABSOLUTE MAXIMUM RATINGS

T_A = 25°C unless otherwise stated		VALUE	UNIT
V_{DS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage	+/-20	V
I_D	Continuous Drain Current, T_C = 25°C	100	A
	Continuous Drain Current, T_A = 25°C(1)	23.5	A
I_{DM}	Pulsed Drain Current, T_A = 25°C(2)	151	A
P_D	Power Dissipation(1)	3.1	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	–55 to 150	°C
E_{AS}	Avalanche Energy, Single Pulse I_D = 45A, L = 0.1mH, R_G = 25Ω	101	mJ

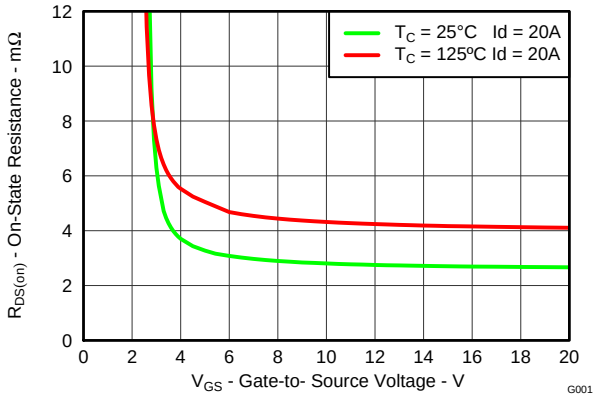
(1) Typical $R_{\theta JA}$ = 40.5°C/W on a 1-inch^2 (6.45-cm^2), 2-oz. (0.071-mm thick) Cu pad on a 0.06-inch (1.52-mm) thick FR4 PCB.

(2) Pulse duration ≤300µs, duty cycle ≤2%

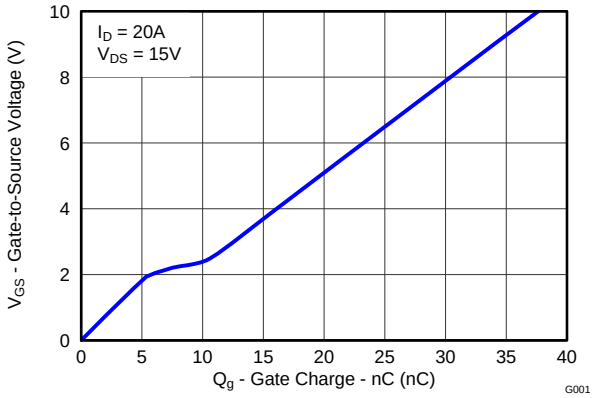
Top View



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



GATE CHARGE



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)

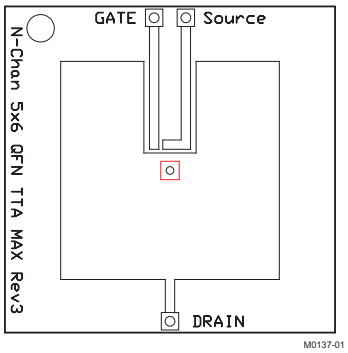
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Static Characteristics						
BV_{DSS}	Drain to Source Voltage	V_{GS} = 0V, I_D = 250µA	30			V
I_{DSS}	Drain to Source Leakage Current	V_{GS} = 0V, V_{DS} = 24V			1	µA
I_{GSS}	Gate to Source Leakage Current	V_{DS} = 0V, V_{GS} = 20V			100	nA
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{DS} = V_{GS}, I_D = 250µA	1	1.5	1.9	V
$R_{DS(on)}$	Drain to Source On Resistance	V_{GS} = 4.5V, I_D = 20A		3.5	4	mΩ
		V_{GS} = 10V, I_D = 20A		2.7	3.1	mΩ
g_{fs}	Transconductance	V_{DS} = 15V, I_D = 20A		106		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 15V, f = 1MHz		2710	3252	pF
C_{oss}	Output Capacitance			635	762	pF
C_{rss}	Reverse Transfer Capacitance			48	60	pF
R_G	Series Gate Resistance			0.7	0.9	Ω
Q_g	Gate Charge Total (4.5V)	V_{DS} = 15V, I_D = 20A		17.5	21.5	nC
Q_{gd}	Gate Charge Gate to Drain			4.7		nC
Q_{gs}	Gate Charge Gate to Source			5.8		nC
$Q_{g(th)}$	Gate Charge at Vth			4.1		nC
Q_{oss}	Output Charge	V_{DS} = 15V, V_{GS} = 0V		19.6		nC
$t_{d(on)}$	Turn On Delay Time	V_{DS} = 15V, V_{GS} = 4.5V, I_{DS} = 20A, R_G = 0.75Ω		9.7		ns
t_r	Rise Time			17		ns
$t_{d(off)}$	Turn Off Delay Time			14.8		ns
t_f	Fall Time			5.2		ns
Diode Characteristics						
V_{SD}	Diode Forward Voltage	I_{DS} = 20A, V_{GS} = 0V		0.8	1	V
Q_{rr}	Reverse Recovery Charge	V_{DS}= 14V, I_F = 20A, di/dt = 300A/µs		23.8		nC
t_{rr}	Reverse Recovery Time			23.1		ns

THERMAL CHARACTERISTICS

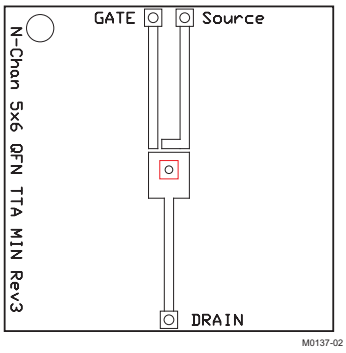
(T_A = 25°C unless otherwise stated)

PARAMETER		MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Thermal Resistance Junction to Case(1)			1.3	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient(1)(2)			50.6	°C/W

(1) $R_{\theta JC}$ is determined with the device mounted on a 1-inch^2 (6.45-cm^2), 2-oz. (0.071-mm thick) Cu pad on a 1.5-inch × 1.5-inch (3.81-cm × 3.81-cm), 0.06-inch (1.52-mm) thick FR4 PCB. $R_{\theta JC}$ is specified by design, whereas $R_{\theta JA}$ is determined by the user's board design.
(2) Device mounted on FR4 material with 1-inch^2 (6.45-cm^2), 2-oz. (0.071-mm thick) Cu.



Max $R_{\theta JA}$ = 50.6°C/W when mounted on 1 inch^2 (6.45-cm^2) of 2-oz. (0.071-mm thick) Cu.



Max $R_{\theta JA}$ = 122.4°C/W when mounted on a minimum pad area of 2-oz. (0.071-mm thick) Cu.

TYPICAL MOSFET CHARACTERISTICS

(T_A = 25°C unless otherwise stated)

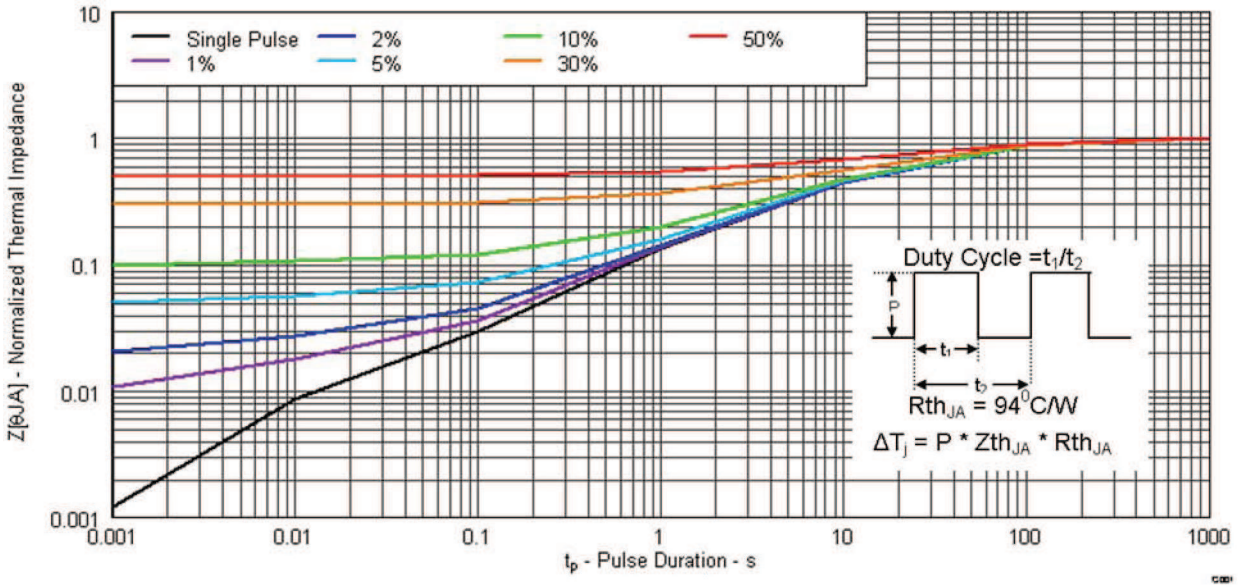


Figure 1. Transient Thermal Impedance

TYPICAL MOSFET CHARACTERISTICS (continued)

(T_A = 25°C unless otherwise stated)

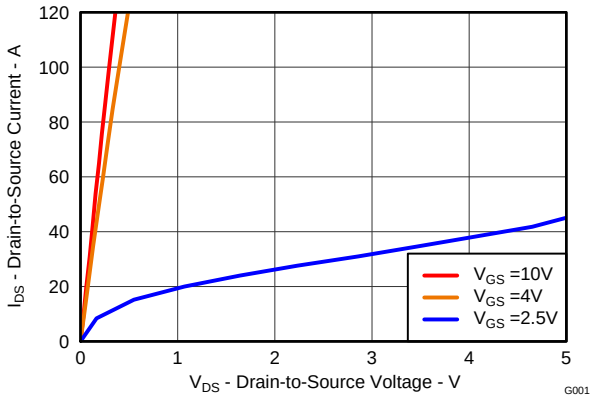


Figure 2. Saturation Characteristics

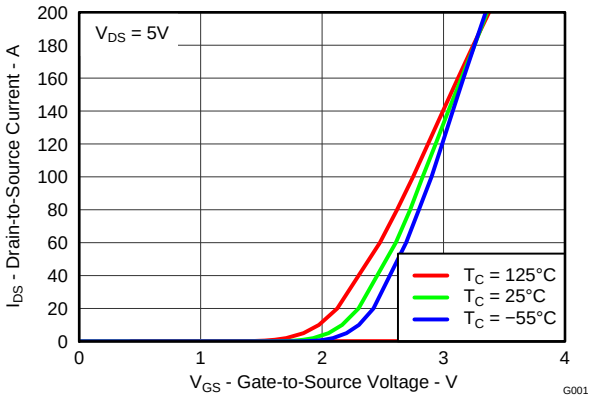


Figure 3. Transfer Characteristics

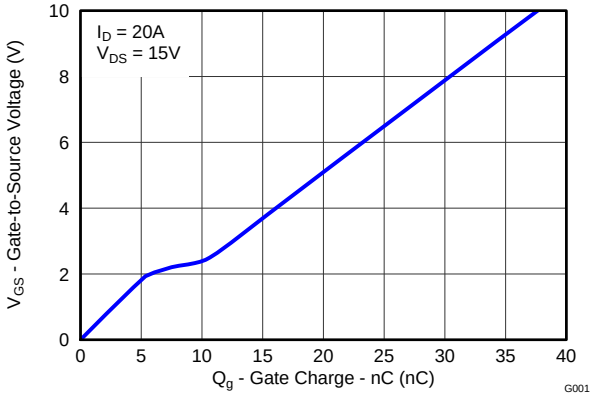


Figure 4. Gate Charge

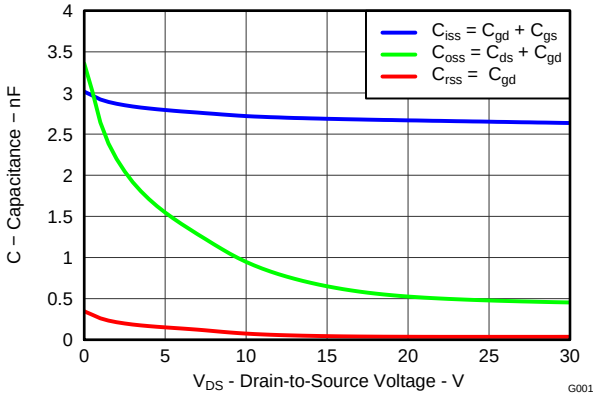


Figure 5. Capacitance

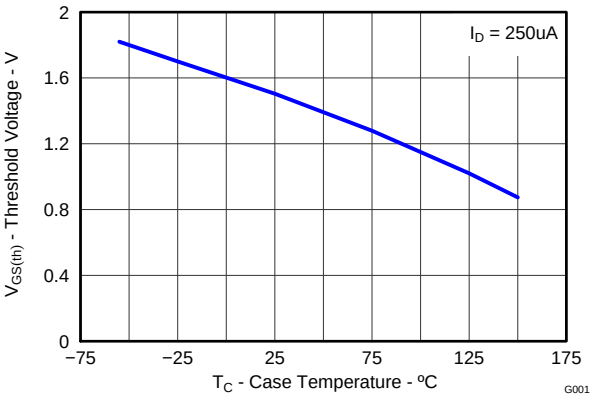


Figure 6. Threshold Voltage vs. Temperature

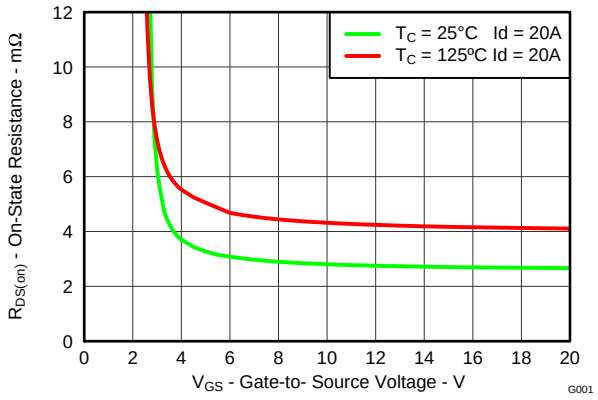


Figure 7. On-State Resistance vs. Gate-to-Source Voltage

TYPICAL MOSFET CHARACTERISTICS (continued)

(T_A = 25°C unless otherwise stated)

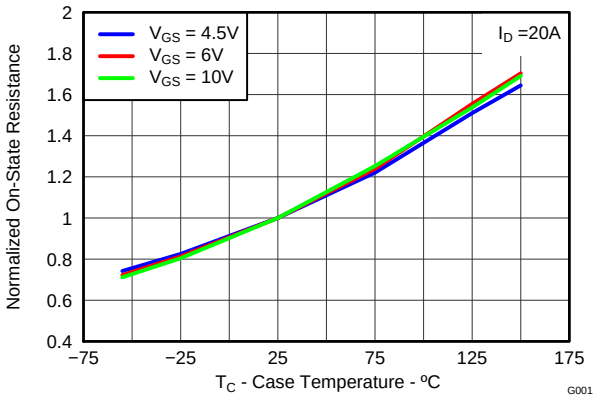


Figure 8. Normalized On-State Resistance vs. Temperature

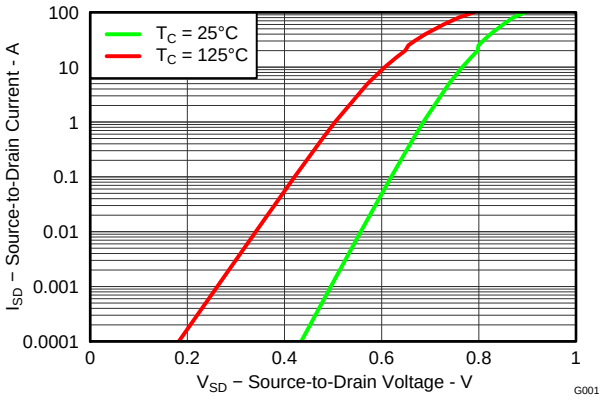


Figure 9. Typical Diode Forward Voltage

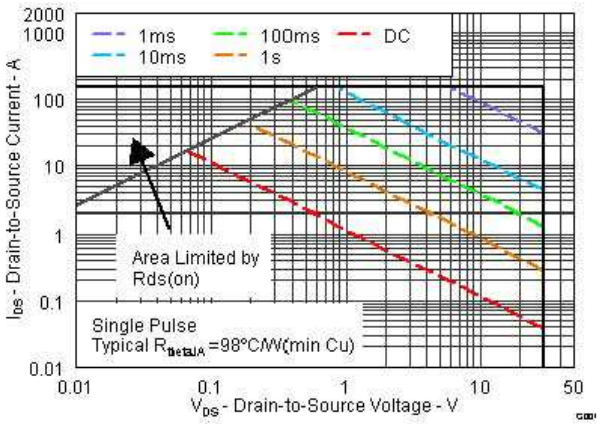


Figure 10. Maximum Safe Operating Area

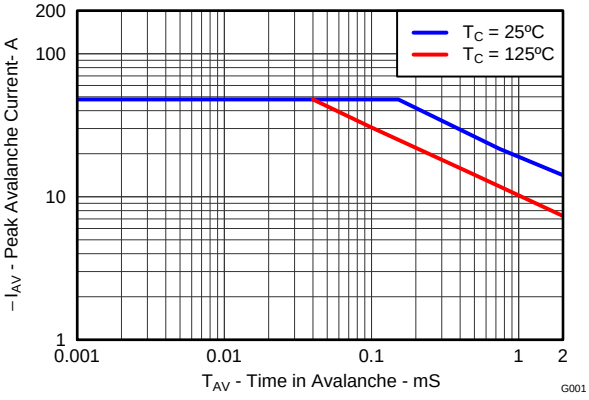


Figure 11. Single Pulse Unclamped Inductive Switching

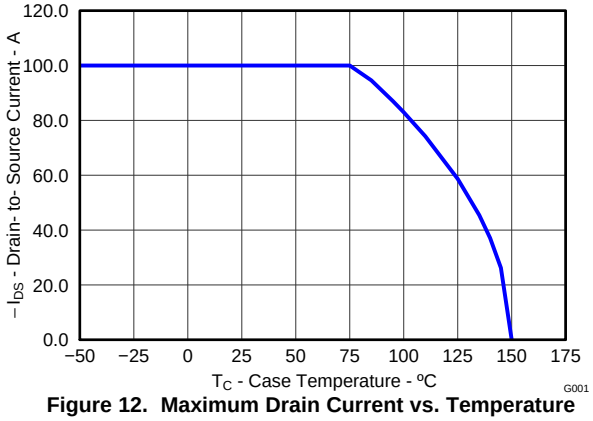
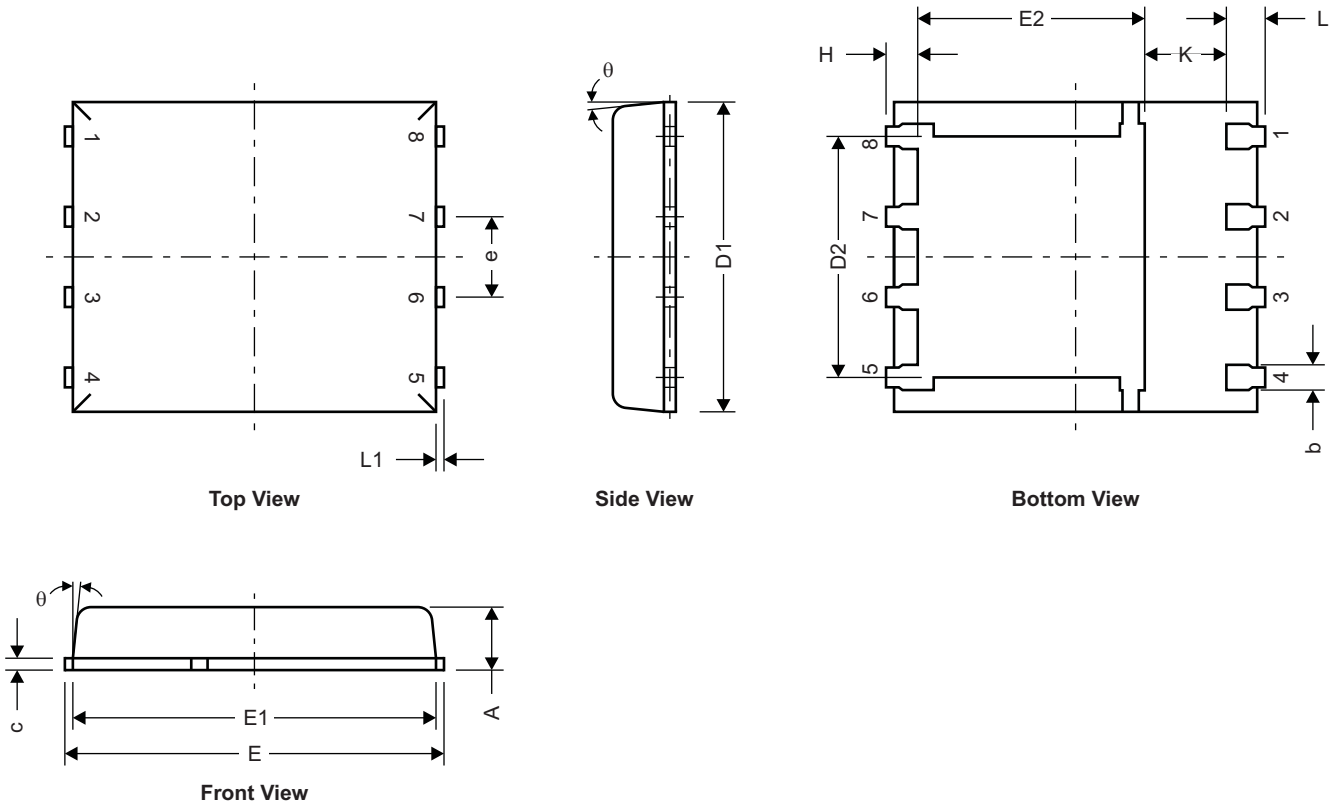


Figure 12. Maximum Drain Current vs. Temperature

MECHANICAL DATA

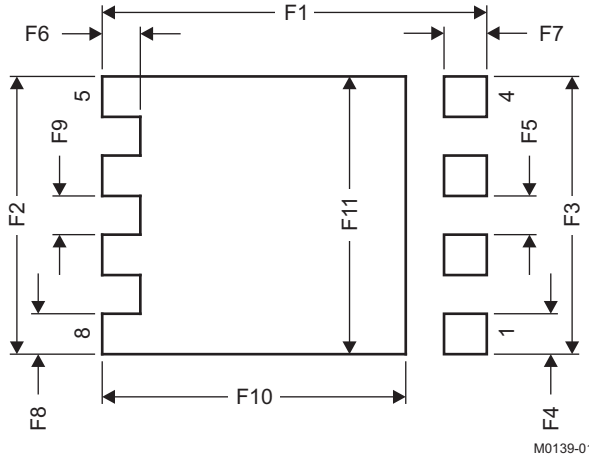
Q5A Package Dimensions



M0135-01

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.90	1.00	1.10
b	0.33	0.41	0.51
c	0.20	0.25	0.34
D1	4.80	4.90	5.00
D2	3.61	3.81	4.02
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.17	1.27	1.37
H	0.41	0.56	0.71
K	1.10		
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
θ	0°		12°

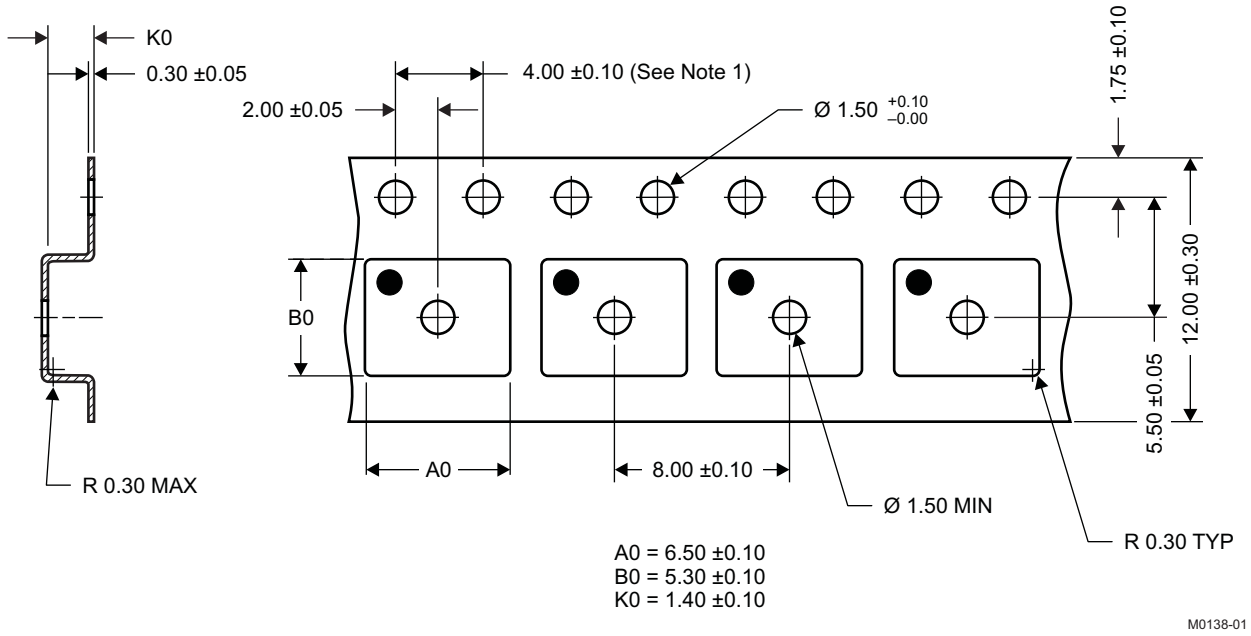
Figure 13. Recommended PCB Pattern



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
F1	6.205	6.305	0.244	0.248
F2	4.46	4.56	0.176	0.18
F3	4.46	4.56	0.176	0.18
F4	0.65	0.7	0.026	0.028
F5	0.62	0.67	0.024	0.026
F6	0.63	0.68	0.025	0.027
F7	0.7	0.8	0.028	0.031
F8	0.65	0.7	0.026	0.028
F9	0.62	0.67	0.024	0.026
F10	4.9	5	0.193	0.197
F11	4.46	4.56	0.176	0.18

For recommended circuit layout for PCB designs, see application note SLPA005 – *Reducing Ringing Through PCB Layout Techniques*.

Q5A Tape and Reel Information



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. A0 and B0 measured on a plane 0.3mm above the bottom of the pocket

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
CSD17553Q5A	Active	Production	VSONP (DQJ) | 8	2500 | LARGE T&R	ROHS Exempt	SN	Level-1-260C-UNLIM	-55 to 150	CSD17553
CSD17553Q5A.B	Active	Production	VSONP (DQJ) | 8	2500 | LARGE T&R	ROHS Exempt	SN	Level-1-260C-UNLIM	-55 to 150	CSD17553

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

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

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale, TI’s General Quality Guidelines, or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Last updated 10/2025