



30-V, N-Channel NexFET™ Power MOSFETs

Check for Samples: [CSD17381F4](#)

FEATURES

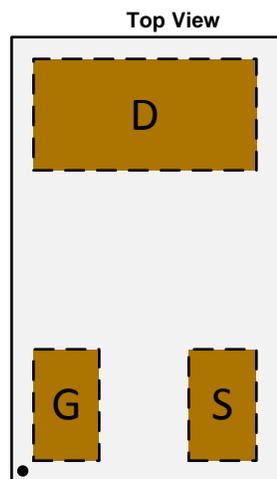
- **Ultra Low On Resistance**
- **Ultra Low Q_g and Q_{gd}**
- **Low Threshold Voltage**
- **Ultra Small Footprint (0402 Case Size)**
 - 1.0 mm x 0.6 mm
- **Ultra Low Profile**
 - 0.35 mm Height
- **Pb and Halogen Free**
- **RoHS Compliant**

APPLICATIONS

- **Optimized for Load Switch Applications**
- **Optimized for General Purpose Switching Applications**
- **Single Cell Battery Applications**
- **Handheld and Mobile Applications**

DESCRIPTION

The FemtoFET™ MOSFET technology has been designed and optimized to minimize the footprint in many handheld and mobile applications. This technology is capable of replacing standard small signal MOSFETs while providing at least a 60% reduction in footprint size.



PRODUCT SUMMARY

V_{DS}	Drain to Source Voltage	30	V
Q_g	Gate Charge Total (4.5V)	1040	pC
Q_{gd}	Gate Charge Gate to Drain	133	pC
$R_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = 1.8V$	160
		$V_{GS} = 2.5V$	110
		$V_{GS} = 4.5V$	90
$V_{GS(th)}$	Threshold Voltage	0.85	V

ORDERING INFORMATION

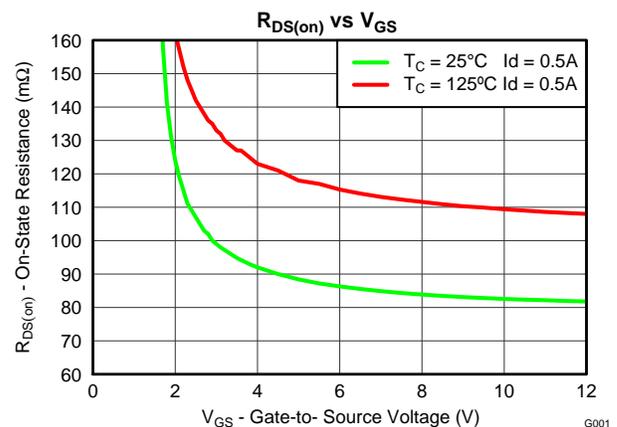
Device	Package	Media	Qty	Ship
CSD17381F4	Femto(0402) 1.0mm x 0.6mm SMD Lead Less	13-Inch Reel	2500	Tape and Reel

ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$ unless otherwise stated		VALUE	UNIT
V_{DS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage	12	V
I_D	Continuous Drain Current, $T_A = 25^\circ\text{C}^{(1)}$	3.1	A
I_{DM}	Pulsed Drain Current, $T_A = 25^\circ\text{C}^{(2)}$	10	A
P_D	Power Dissipation ⁽¹⁾	500	mW
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
E_{AS}	Avalanche Energy, single pulse $I_D = 7.4A$, $L = 0.1mH$, $R_G = 25\Omega$	2.7	mJ

(1) Typical $R_{\theta JA} = 90^\circ\text{C/W}$ on 1-inch² (6.45-cm²), 2-oz. (0.071-mm thick) Cu pad on a 0.06-inch (1.52-mm) thick FR4 PCB.

(2) Pulse duration $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$



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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	$V_{GS} = 0V, I_{DS} = 250\mu A$	30			V
I_{DSS}	Drain to Source Leakage Current	$V_{GS} = 0V, V_{DS} = 24V$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{DS} = 0V, V_{GS} = 10V$			100	nA
$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{DS} = V_{GS}, I_{DS} = 250\mu A$	0.65	0.85	1.10	V
$R_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = 1.8V, I_{DS} = 0.5A$		160	250	m Ω
		$V_{GS} = 2.5V, I_{DS} = 0.5A$		110	143	m Ω
		$V_{GS} = 4.5V, I_{DS} = 0.5A$		90	117	m Ω
		$V_{GS} = 8V, I_{DS} = 0.5A$		84	109	m Ω
g_{fs}	Transconductance	$V_{DS} = 15V, I_{DS} = 0.5A$		4.8		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{GS} = 0V, V_{DS} = 15V,$ $f = 1\text{MHz}$		150	195	pF
C_{oss}	Output Capacitance			44	57	pF
C_{rss}	Reverse Transfer Capacitance			2.2	2.9	pF
R_G	Series Gate Resistance			23		Ω
Q_g	Gate Charge Total (4.5V)	$V_{DS} = 15V, I_{DS} = 0.5A$		1040	1350	pC
Q_{gd}	Gate Charge Gate to Drain			133		pC
Q_{gs}	Gate Charge Gate to Source			226		pC
$Q_{g(th)}$	Gate Charge at V_{th}			150		pC
Q_{oss}	Output Charge	$V_{DS} = 15V, V_{GS} = 0V$		1110		pC
$t_{d(on)}$	Turn On Delay Time	$V_{DS} = 0V, V_{GS} = 4.5V,$ $I_{DS} = 0.5A, R_G = 2\Omega$		3.4		ns
t_r	Rise Time			1.4		ns
$t_{d(off)}$	Turn Off Delay Time			10.8		ns
t_f	Fall Time			3.6		ns
Diode Characteristics						
V_{SD}	Diode Forward Voltage	$I_{SD} = 0.5A, V_{GS} = 0V$		0.73	0.9	V
Q_{rr}	Reverse Recovery Charge	$V_{DS} = 15V, I_F = 0.5A, di/dt = 300A/\mu s$		1500		pC
t_{rr}	Reverse Recovery Time			5.6		ns

THERMAL CHARACTERISTICS

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

PARAMETER		Typical Values	UNIT
$R_{\theta JA}$	Thermal Resistance Junction to Ambient ⁽¹⁾	90	$^\circ\text{C/W}$
	Thermal Resistance Junction to Ambient ⁽²⁾	250	$^\circ\text{C/W}$

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

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

TYPICAL MOSFET CHARACTERISTICS

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

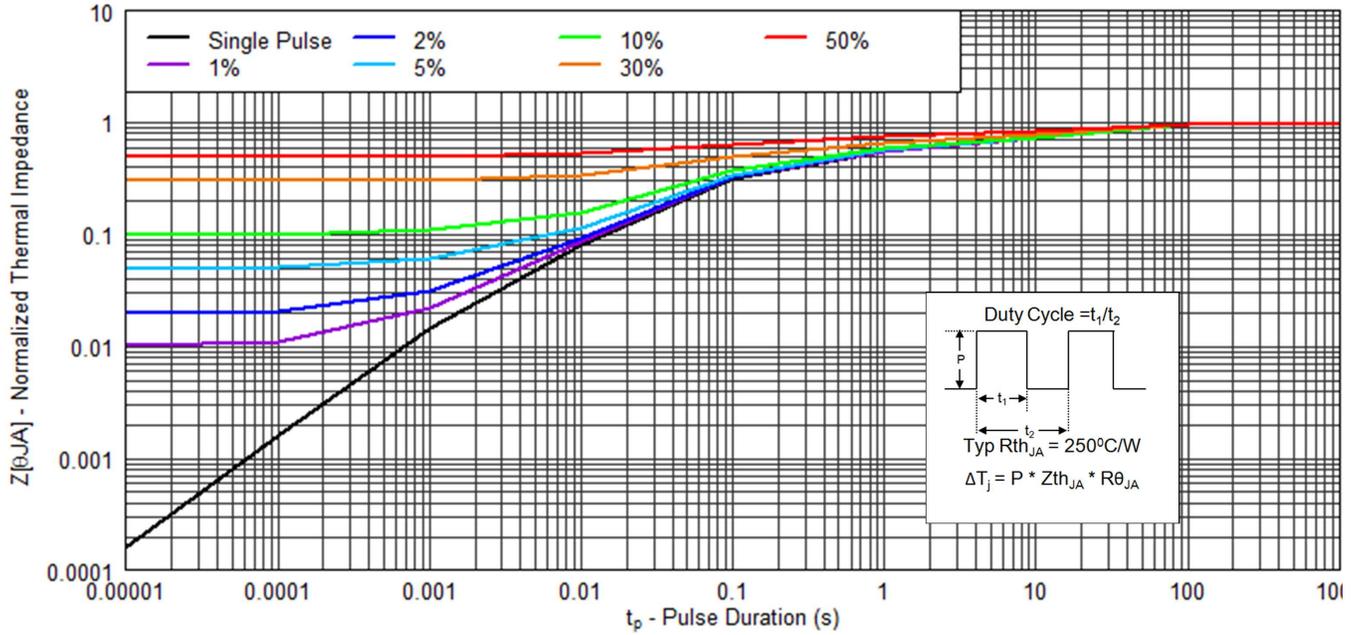


Figure 1. Transient Thermal Impedance

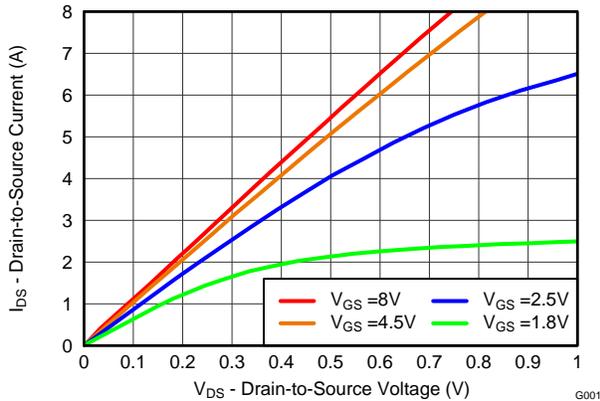


Figure 2. Saturation Characteristics

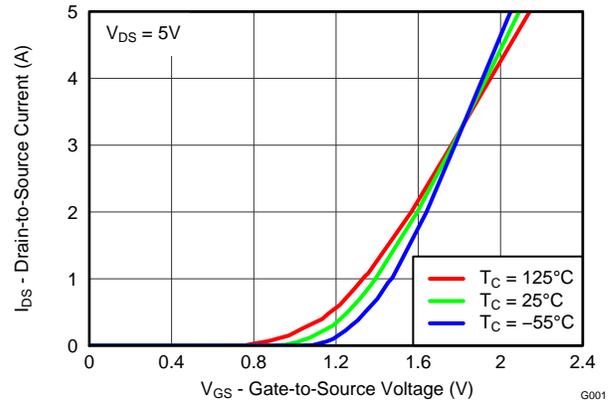


Figure 3. Transfer Characteristics

TYPICAL MOSFET CHARACTERISTICS (continued)

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

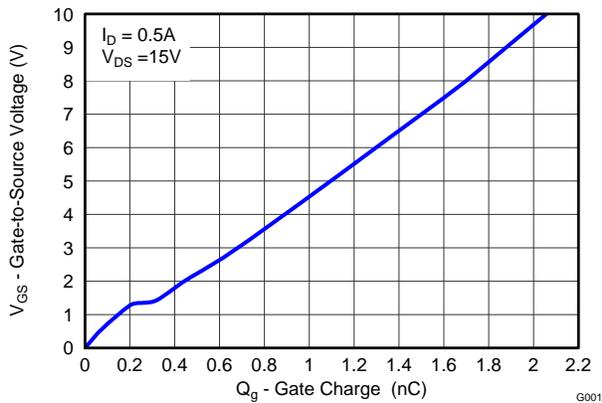


Figure 4. Gate Charge

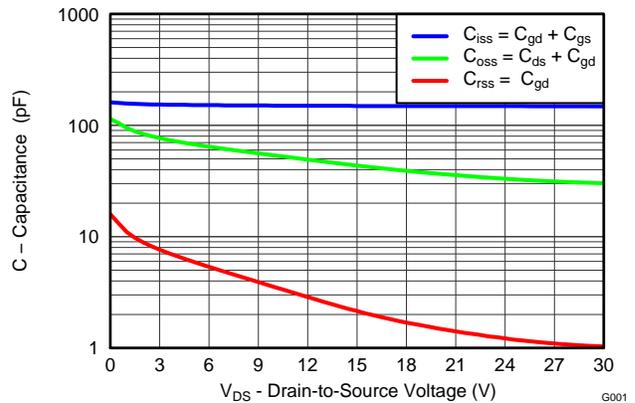


Figure 5. Capacitance

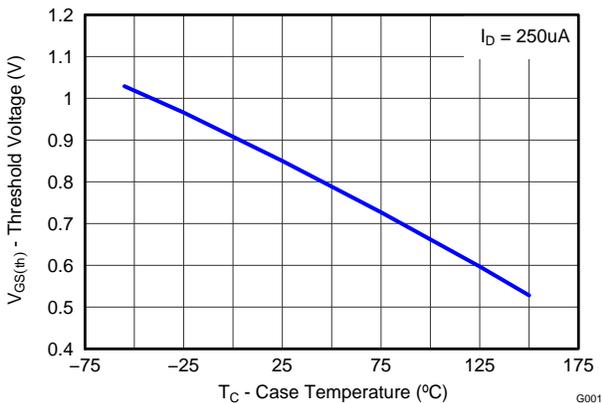


Figure 6. Threshold Voltage vs. Temperature

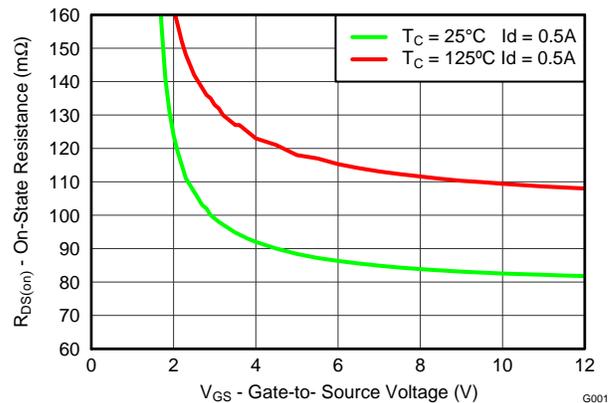


Figure 7. On-State Resistance vs. Gate-to-Source Voltage

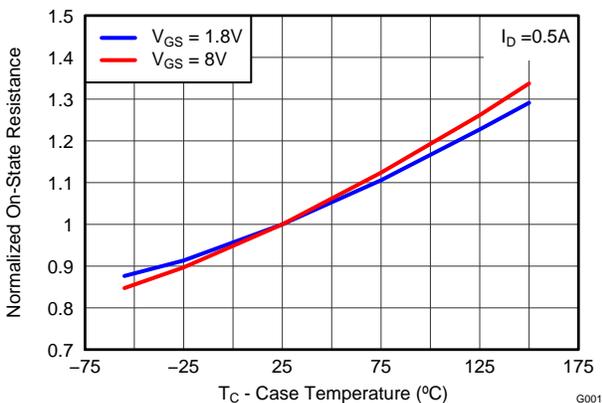


Figure 8. Normalized On-State Resistance vs. Temperature

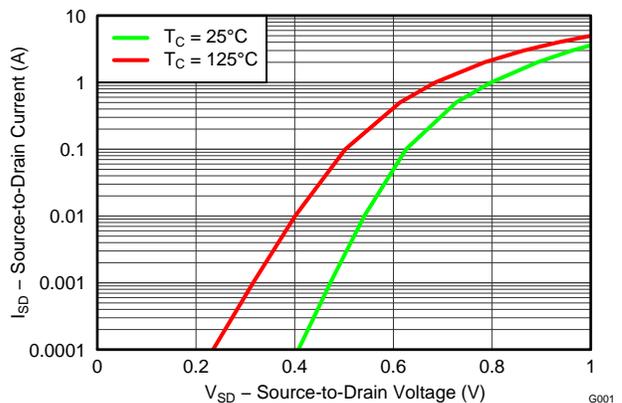


Figure 9. Typical Diode Forward Voltage

TYPICAL MOSFET CHARACTERISTICS (continued)

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

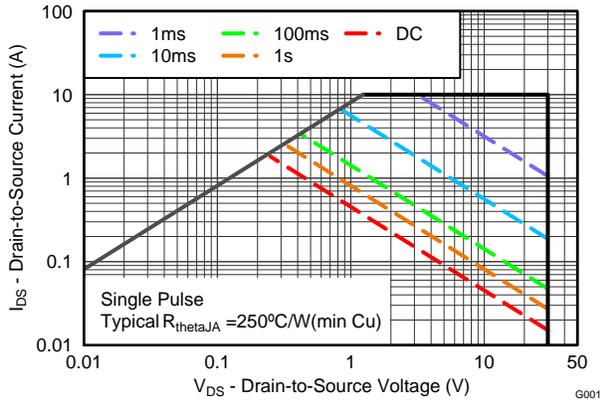


Figure 10. Maximum Safe Operating Area

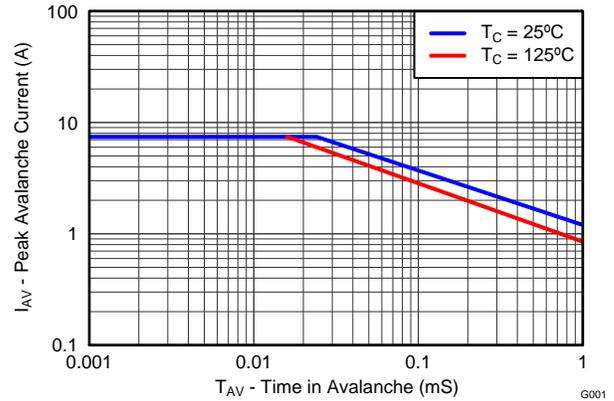


Figure 11. Single Pulse Unclamped Inductive Switching

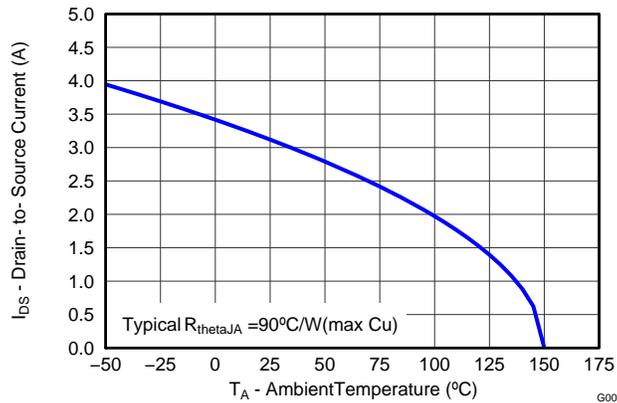
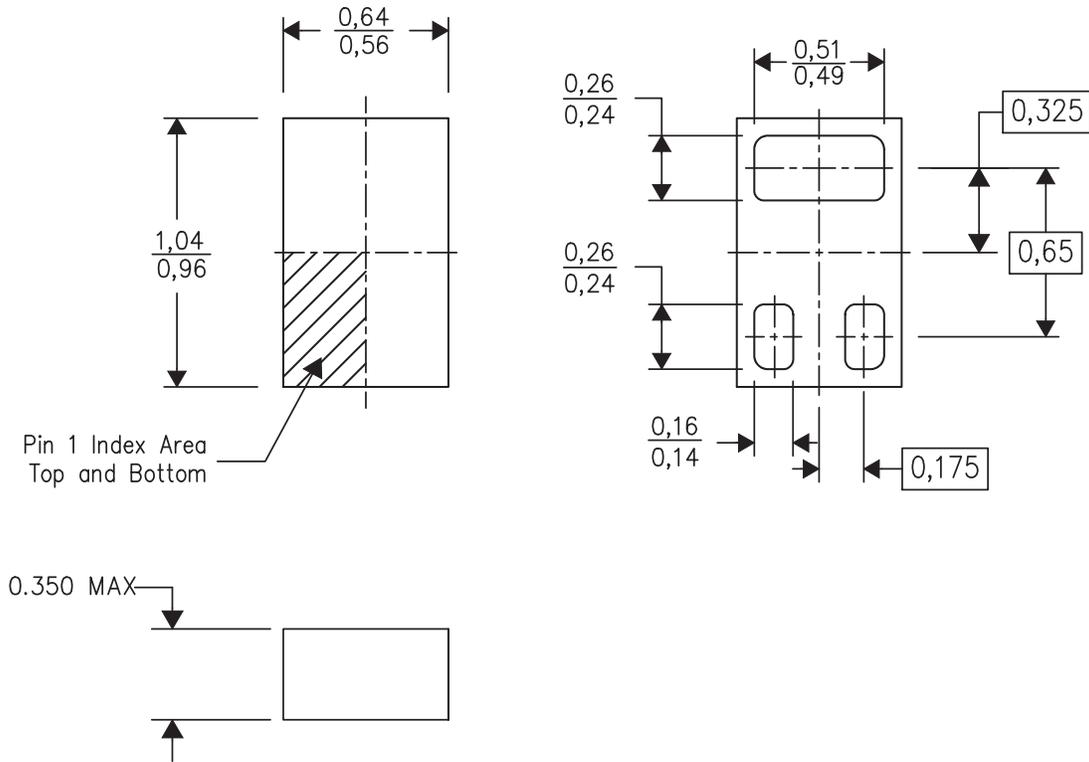


Figure 12. Maximum Drain Current vs. Temperature

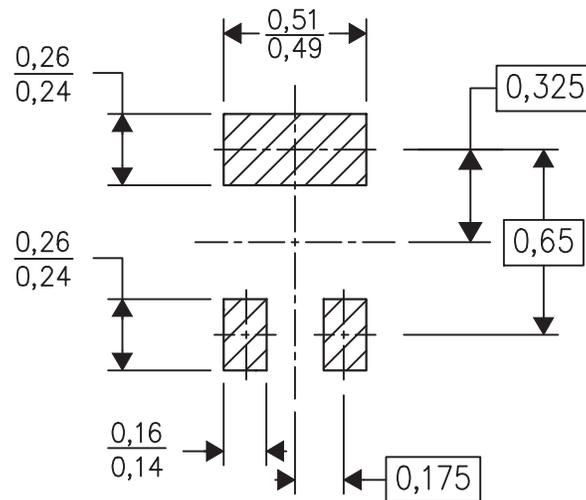
MECHANICAL DATA

0402 Mechanical Dimensions



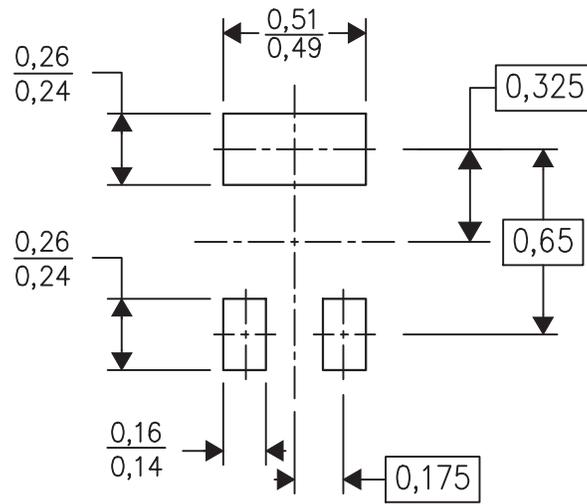
- (1) All linear dimensions are in millimeters (dimensions and tolerancing per AME T14.5M-1994)
- (2) This drawing is subject to change without notice
- (3) This package is a PB-Free solder land design

Recommended Minimum PCB Layout



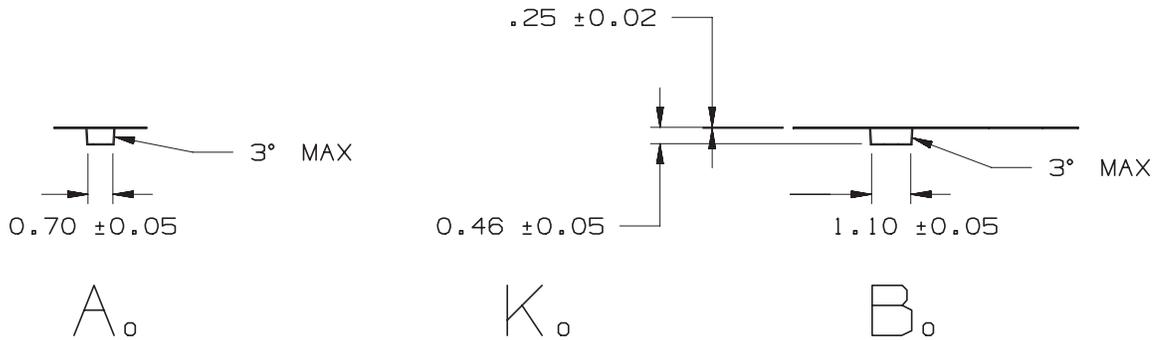
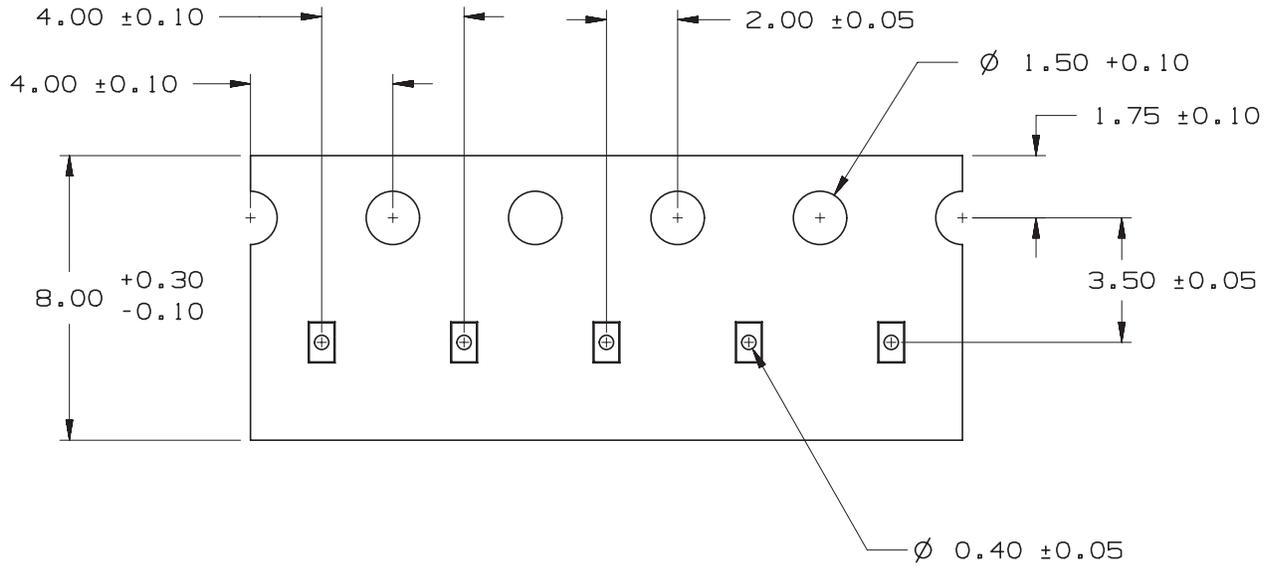
- (1) All dimensions are in millimeters.

Recommended Stencil Pattern



(1) All dimensions are in millimeters.

CSD17381F4 Embossed Carrier Tape Dimensions



- (1) Pin 1 will be oriented in the top right quadrant of the tape enclosure (Quadrant 2), closest to the carrier tape sprocket holes.

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