

## 1. Description

The CSD16401Q5(ES) is N-Channel enhancement MOS Field Effect Transistor. Uses advanced shielded gate trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product CSD16401Q5(ES) is Pb-free.

## 2. Features

- 30V,  $R_{DS(ON)}=1.15m\Omega(TYP.) @V_{GS}=10V$
- $R_{DS(ON)}=1.65m\Omega(TYP.) @V_{GS}=4.5V$
- Use trench MOSFET technology
- High density cell design for low  $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

## 3. Applications

- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

**100% UIS TESTED**

## 4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
CSD16401Q5(ES)	PDFN5*6-8L	.6512A/LOT	Halogen free	Tape & Reel	5,000 PCS	UL 94V-0	13 inches

Table-1 Ordering information

## 5. Pin Configuration and Functions


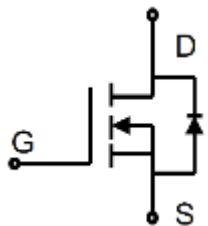
Pin	Function	Outline	Circuit Diagram
4	Gate	Note b  	
1/2/3	Source		
5/6/7/8	Drain		

Table-2 Pin configuration

## 6. Specification

### Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$BV_{DSS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	$T_C=25^\circ\text{C}$	180
		$T_C=100^\circ\text{C}$	108
Maximum Power Dissipation	$P_D$	83	W
Pulsed Drain Current	$I_{DM}$	720	A
Avalanche Current (L=0.5mH)	$I_{AS}$	33	A
Avalanche energy <sup>a</sup>	$E_{AS}$	272	mJ
Operating Junction Temperature	$T_J$	-55 to 150	°C
Lead Temperature	$T_L$	260	°C
Storage Temperature Range	$T_{stg}$	-55 to 150	°C

### Thermal resistance ratings

Single Operation			
Parameter	Symbol	Typical	Unit
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	1.5	°C/W

Notes:

a: EAS condition: Starting  $T_J=25^\circ\text{C}$ ,  $V_{DD}=15\text{V}$ ,  $V_G=10\text{V}$ ,  $R_G=25\text{ohm}$ ,  $L=0.5\text{mH}$ .

b: This diagram is only an electrical schematic, and the actual pin size is based on POD.

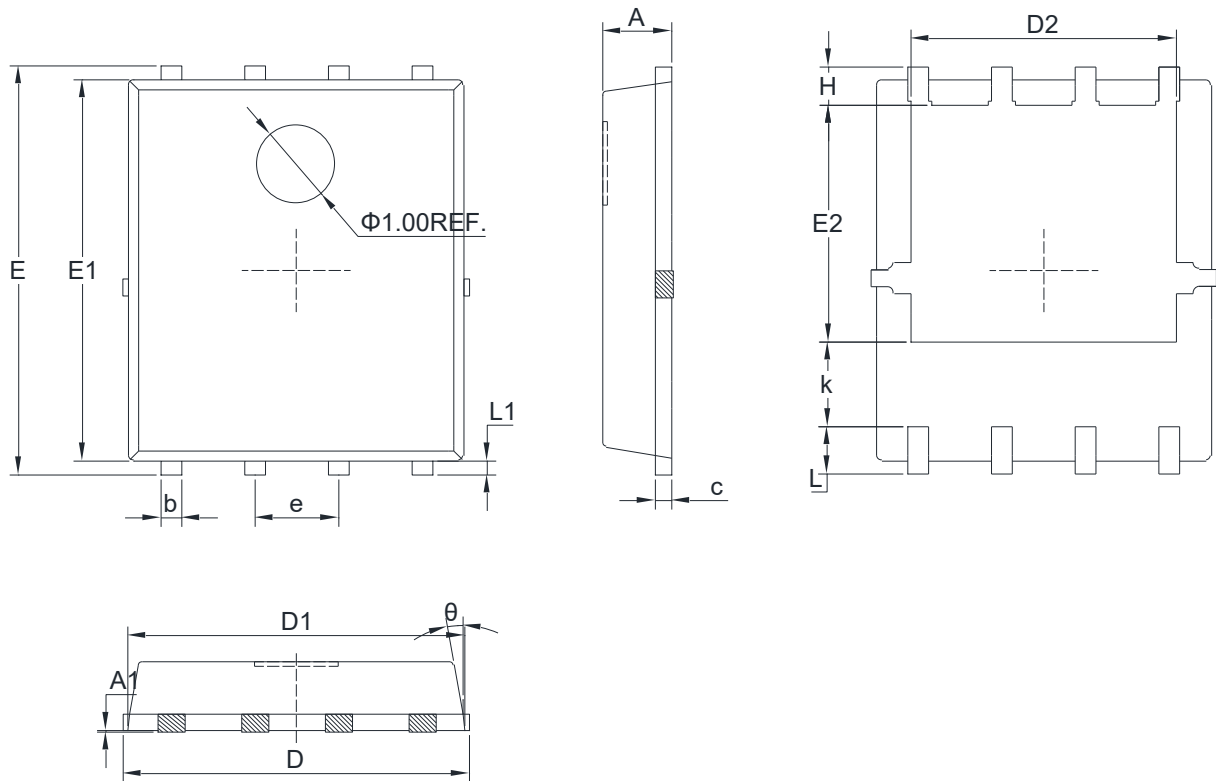
## Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$			1.0	$\mu A$
Gate-to-source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.1	1.6	2.2	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$		1.15	1.5	$m\Omega$
		$V_{GS}=4.5V, I_D=20A$		1.65	2.2	$m\Omega$
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0V, f=1MHz, V_{DS}=15V$		3100		$pF$
Output Capacitance	$C_{OSS}$			1757		
Reverse Transfer Capacitance	$C_{RSS}$			98		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=0 \text{ to } 10V, V_{DS}=20V, I_D=30A$		44		nC
Gate-to-Source Charge	$Q_{GS}$			9		
Gate-to-Drain Charge	$Q_{GD}$			6		
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=10V, V_{DD}=20V, I_D=30A, R_G=1.6\Omega$		17		ns
Rise Time	$t_r$			5		
Turn-Off Delay Time	$t_{d(OFF)}$			52		
Fall Time	$t_f$			12		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=30A$			1.2	V

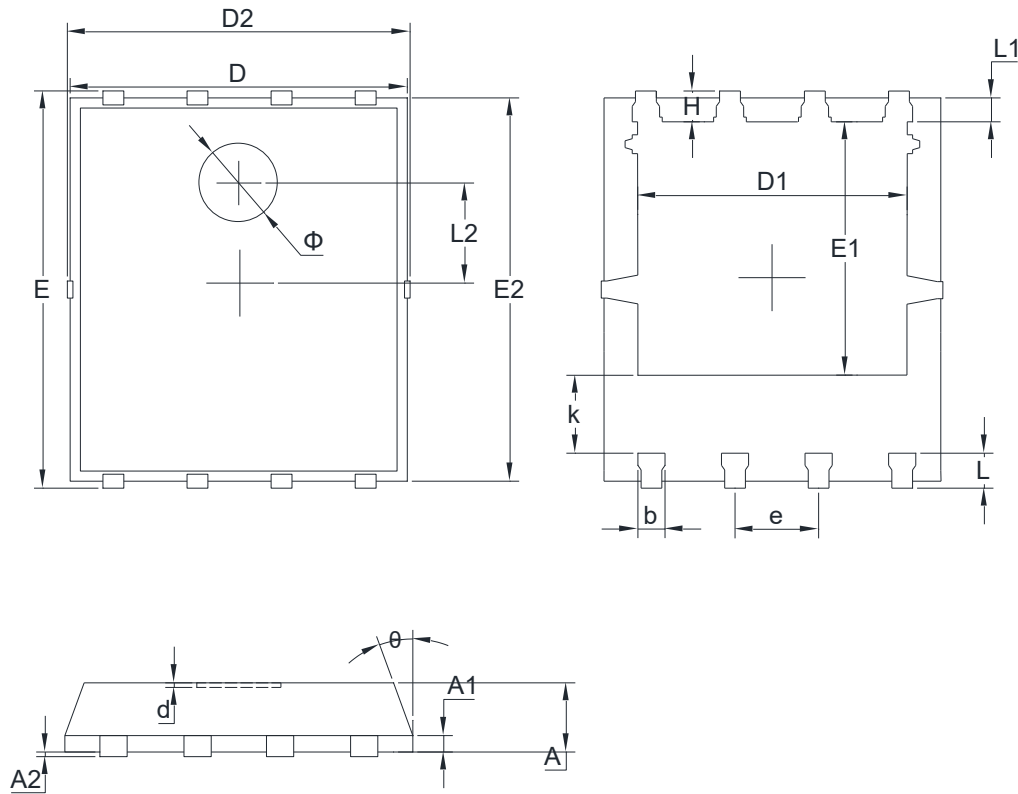
### 7. Dimension (PDFN5\*6-8L)

#### POD A(Q)



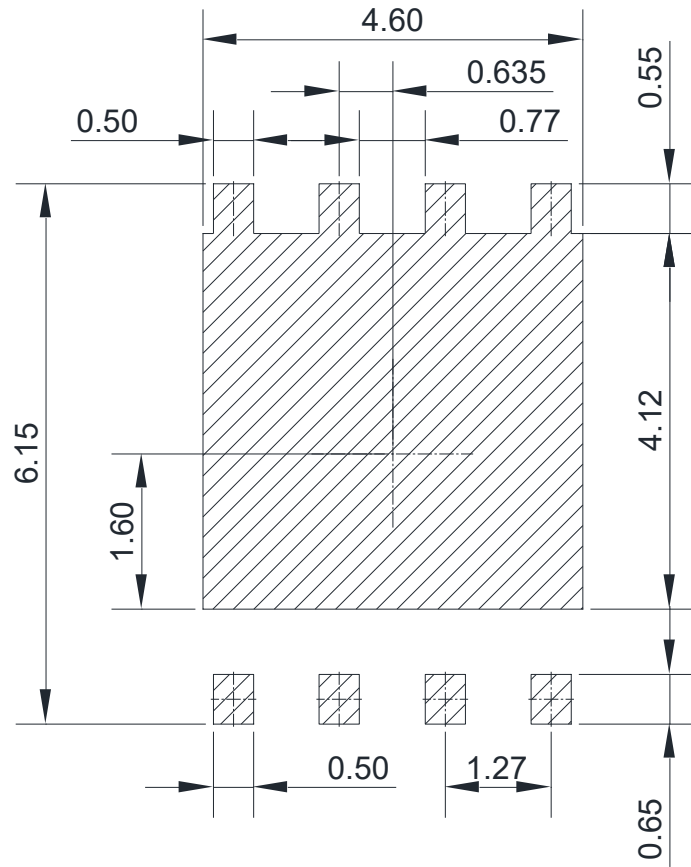
Symbol	Dimensions in Millimeters			Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0.90	1.00	1.10	H	0.46	0.56	0.66
A1			0.05	k	1.10		
b	0.30	0.40	0.50	L	0.51	0.61	0.71
c	0.20	0.25	0.30	L1	0.05	0.15	0.25
D	4.80	5.10	5.40	θ	8°	10°	12°
D2	3.75	3.90	4.05	D1	4.80	4.90	5.00
E	5.95	6.05	6.15				
E1	5.65	5.75	5.85				
e	1.27BCS						
E2	3.34	3.49	3.64				

POD B(X)



Symbol	Dimensions in Millimeters			Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0.900	1.000	1.100	H	0.549	0.625	0.701
A1	0.254 REF			k	1.190	1.290	1.390
A2	0.000		0.050	L	0.534	0.610	0.686
D	4.824	4.900	4.976	L1	0.424	0.500	0.576
D1	3.910	4.010	4.110	$\theta$	8°	10°	12°
D2	4.924	5.000	5.076	L2	1.800 REF		
E	5.924	6.000	6.076	$\Phi$	1.100	1.200	1.300
E1	3.375	3.475	3.575	d			0.100
e	1.270 TYP			b	0.350	0.400	0.450
E2	5.674	5.750	5.826				

8. Recommended Soldering Footprint



DIMENSIONS: MILLIMETERS

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