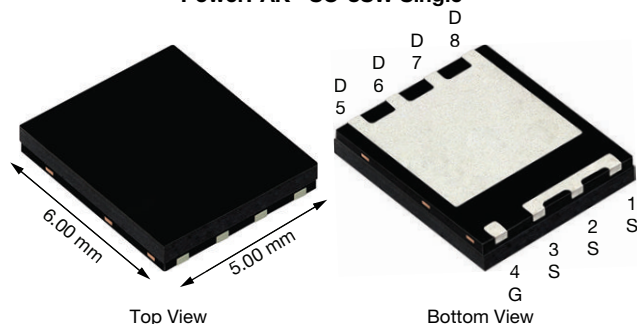


# N-Channel 150 V (D-S) MOSFET

PowerPAK® SO-8SW Single



## FEATURES

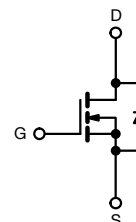
- TrenchFET® Gen V power MOSFET
- Very low  $R_{DS(on)}$  x  $Q_g$  figure-of-merit (FOM)
- Leadership  $R_{DS(on)}$  minimizes power loss from conduction
- 100 %  $R_g$  and UIS tested
- Enhance power dissipation and lower  $R_{thJC}$
- Wettable flank to improved solderability
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
FREE

## APPLICATIONS

- Synchronous rectification
- DC/DC converters
- OR-ing and hot swap switch
- Power supplies
- Motor drive control
- Battery management



N-Channel MOSFET

## PRODUCT SUMMARY

$V_{DS}$ (V)	150
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = 10$ V	0.0086
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = 7.5$ V	0.0098
$Q_g$ typ. (nC)	25.7
$I_D$ (A) <sup>a</sup>	93
Configuration	Single

## ORDERING INFORMATION

Package	PowerPAK SO-8SW
Lead (Pb)-free and halogen-free	SiRS578DPW-T1-RE3

## ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	$V_{DS}$	150	V
Gate-source voltage	$V_{GS}$	$\pm 20$	
Continuous drain current ( $T_J = 150$ °C)	$T_C = 25$ °C	93	A
	$T_C = 70$ °C	74	
	$T_A = 25$ °C	19 <sup>b, c</sup>	
	$T_A = 70$ °C	15 <sup>b, c</sup>	
Pulsed drain current ( $t = 100$ $\mu$ s)	$I_{DM}$	150	
Continuous source-drain diode current	$T_C = 25$ °C	156	
	$T_A = 25$ °C	6.3 <sup>b, c</sup>	
Single pulse avalanche current	$I_{AS}$	32	
Single pulse avalanche energy	$E_{AS}$	50	mJ
Maximum power dissipation	$T_C = 25$ °C	171	W
	$T_C = 70$ °C	110	
	$T_A = 25$ °C	6.9 <sup>b, c</sup>	
	$T_A = 70$ °C	4.4 <sup>b, c</sup>	
Operating junction and storage temperature range	$T_J, T_{stg}$	-55 to +150	°C
Soldering recommendations (peak temperature) <sup>c</sup>		260	

## THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient <sup>b</sup>	$R_{thJA}$	14	18	°C/W
Maximum junction-to-case (drain)	$R_{thJC}$	0.53	0.73	

### Notes

- $T_C = 25$  °C
- Surface mounted on 1" x 1" FR4 board
- $t = 10$  s
- See solder profile ([www.vishay.com/doc?73257](http://www.vishay.com/doc?73257)). The PowerPAK SO-8S is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components
- Maximum under steady state conditions is 50 °C/W



SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	150	-	-	V
V <sub>DS</sub> temperature coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> = 10 mA	-	133	-	mV/°C
V <sub>GS(th)</sub> temperature coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA	-	-9.3	-	
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2.2	-	4	V
Gate-source leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V	-	-	± 100	nA
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = 120 V, V <sub>GS</sub> = 0 V	-	-	1	μA
		V <sub>DS</sub> = 120 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C	-	-	10	
Drain-source on-state resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A	-	0.0069	0.0086	Ω
		V <sub>GS</sub> = 7.5 V, I <sub>D</sub> = 15 A	-	0.0079	0.0098	
Forward transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A	-	60	-	S
Dynamic <sup>b</sup>						
Input capacitance	C <sub>iSS</sub>	V <sub>DS</sub> = 75 V, V <sub>GS</sub> = 0 V, f = 1 MHz	-	2765	-	pF
Output capacitance	C <sub>oss</sub>		-	355	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	10	-	
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> = 75 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A	-	34.2	52	nC
Gate-source charge	Q <sub>gs</sub>	V <sub>DS</sub> = 75 V, V <sub>GS</sub> = 7.5 V, I <sub>D</sub> = 20 A	-	25.7	39	
Gate-drain charge	Q <sub>gd</sub>		-	16.2	-	
Output charge	Q <sub>oss</sub>		-	3.1	-	
Gate resistance	R <sub>g</sub>	V <sub>DS</sub> = 75 V, V <sub>GS</sub> = 0 V	-	130	-	Ω
Turn-on delay time	t <sub>d(on)</sub>	f = 1 MHz	0.24	1.2	2.4	
Rise time	t <sub>r</sub>	V <sub>DD</sub> = 75 V, R <sub>L</sub> = 7.5 Ω, I <sub>D</sub> ≅ 10 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω	-	16	35	ns
Turn-off delay time	t <sub>d(off)</sub>		-	9	20	
Fall time	t <sub>f</sub>		-	25	50	
Turn-on delay time	t <sub>d(on)</sub>		-	12	25	
Rise time	t <sub>r</sub>	V <sub>DD</sub> = 75 V, R <sub>L</sub> = 7.5 Ω, I <sub>D</sub> ≅ 10 A, V <sub>GEN</sub> = 7.5 V, R <sub>g</sub> = 1 Ω	-	20	40	
Turn-off delay time	t <sub>d(off)</sub>		-	14	30	
Fall time	t <sub>f</sub>		-	22	45	
Fall time	t <sub>f</sub>		-	13	25	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	-	-	156	A
Pulse diode forward current	I <sub>SM</sub>		-	-	150	
Body diode voltage	V <sub>SD</sub>	I <sub>S</sub> = 10 A, V <sub>GS</sub> = 0 V	-	0.75	1.1	V
Body diode reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 10 A, di/dt = 100 A/μs, T <sub>J</sub> = 25 °C	-	81	160	ns
Body diode reverse recovery charge	Q <sub>rr</sub>		-	221	440	nC
Reverse recovery fall time	t <sub>a</sub>		-	63	-	ns
Reverse recovery rise time	t <sub>b</sub>		-	18	-	

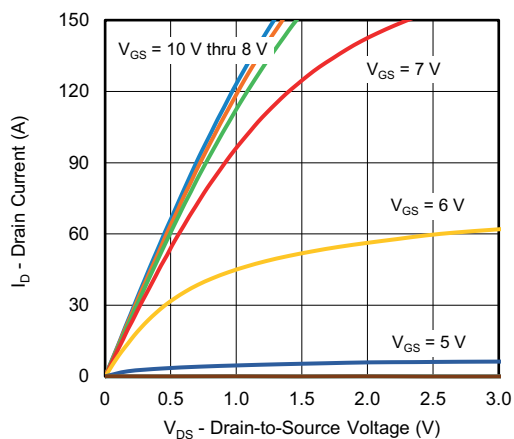
**Notes**

- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$   
b. Guaranteed by design, not subject to production testing

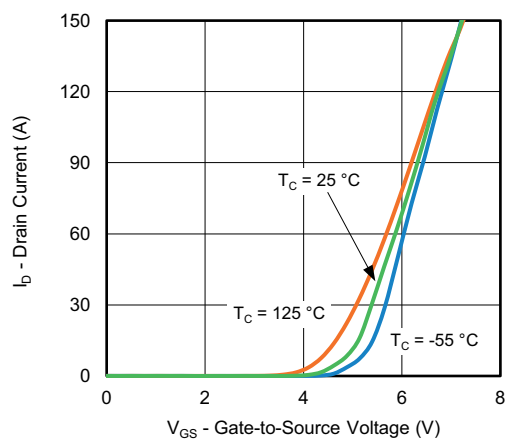
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



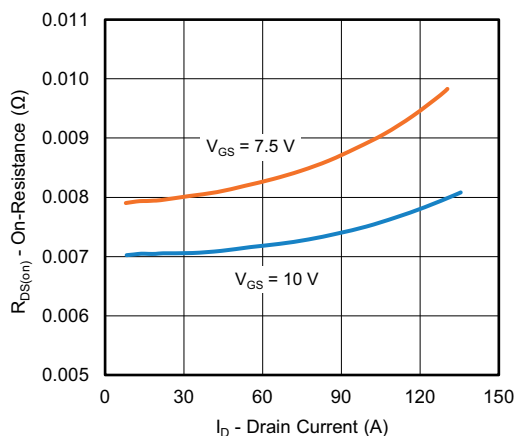
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



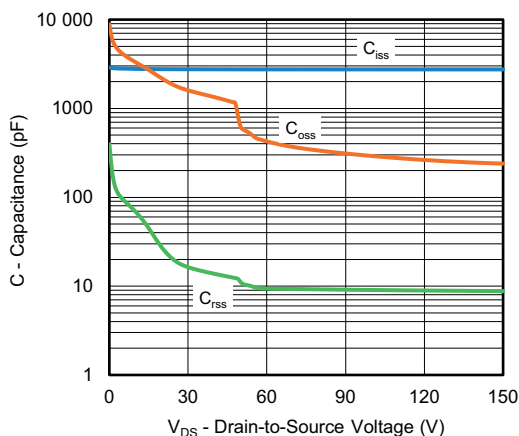
**Output Characteristics**



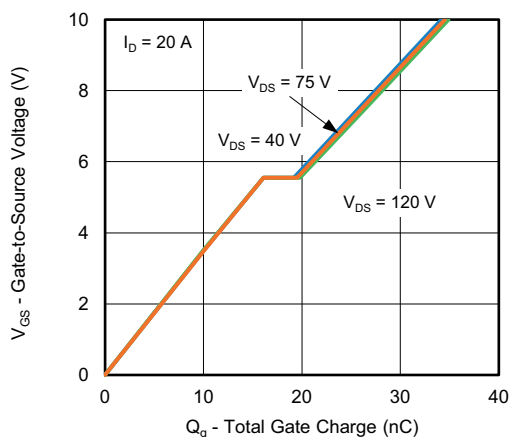
**Transfer Characteristics**



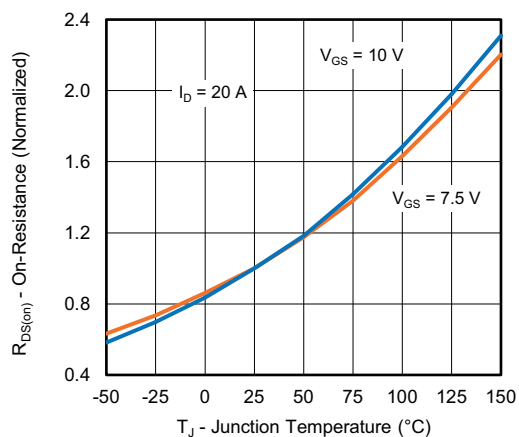
**On-Resistance vs. Drain Current and Gate Voltage**



**Capacitance**



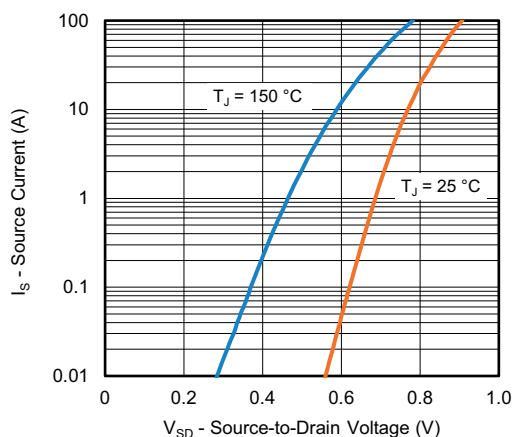
**Gate Charge**



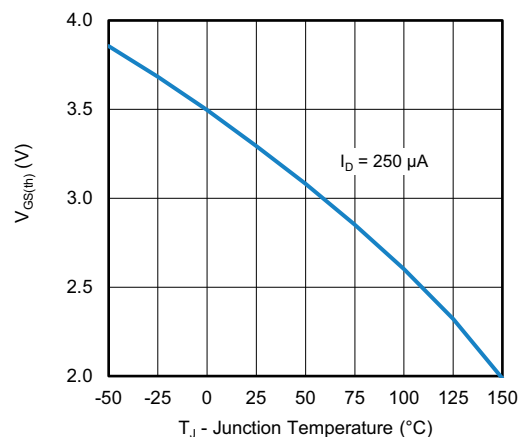
**On-Resistance vs. Junction Temperature**



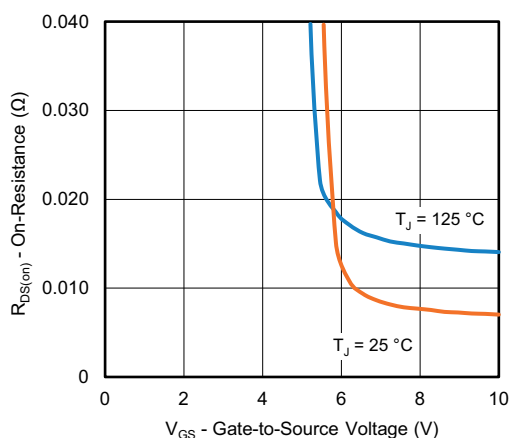
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



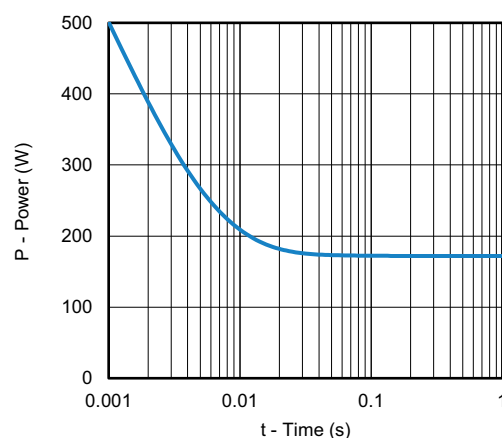
Source-Drain Diode Forward Voltage



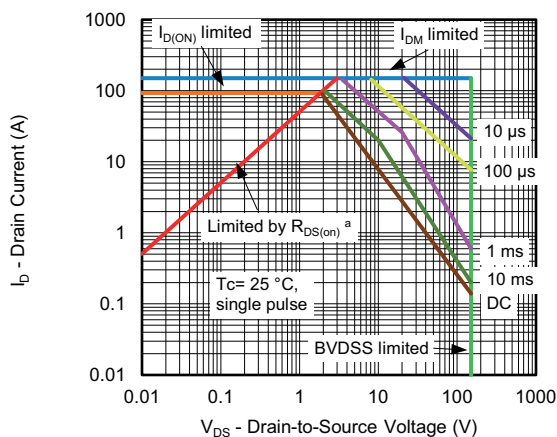
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage



Single Pulse Power, Junction-to-Case



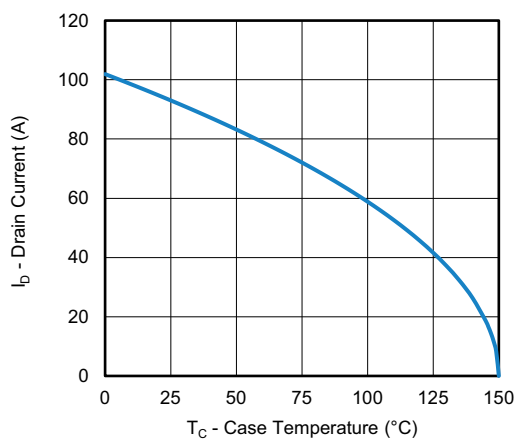
Safe Operating Area, Junction-to-Case

**Note**

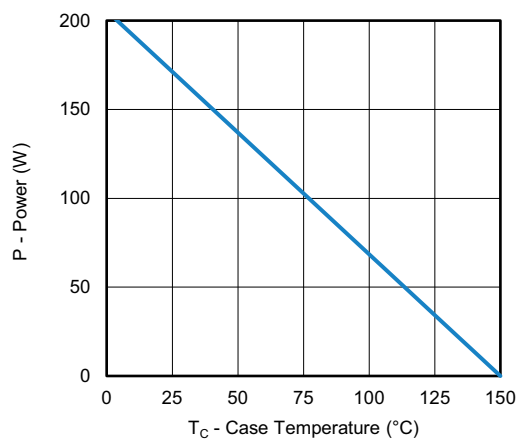
a.  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified



**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



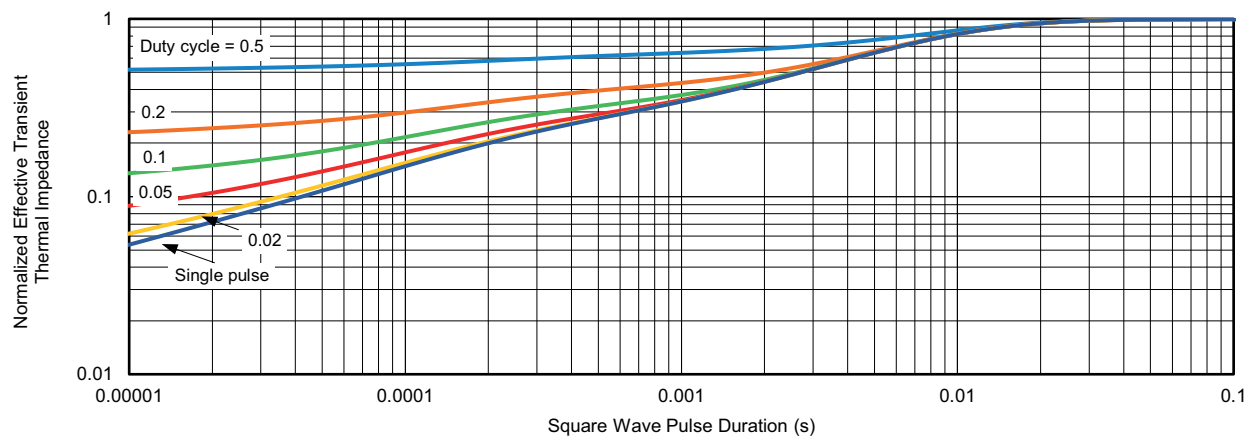
**Current Derating <sup>a</sup>**



**Power, Junction-to-Case**

**Note**

- a. The power dissipation  $P_D$  is based on  $T_J \text{ max.} = 150^\circ\text{C}$ , using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



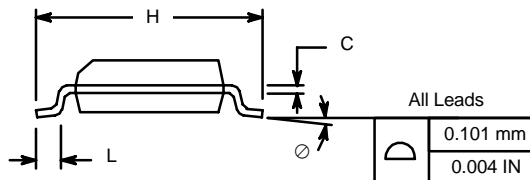
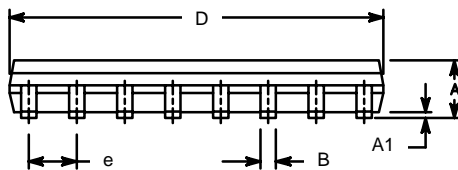
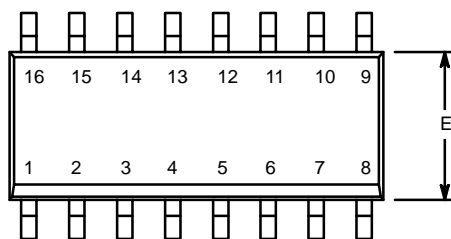
**Normalized Thermal Transient Impedance, Junction-to-Case**

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### SOIC (NARROW): 16-LEAD

JEDEC Part Number: MS-012

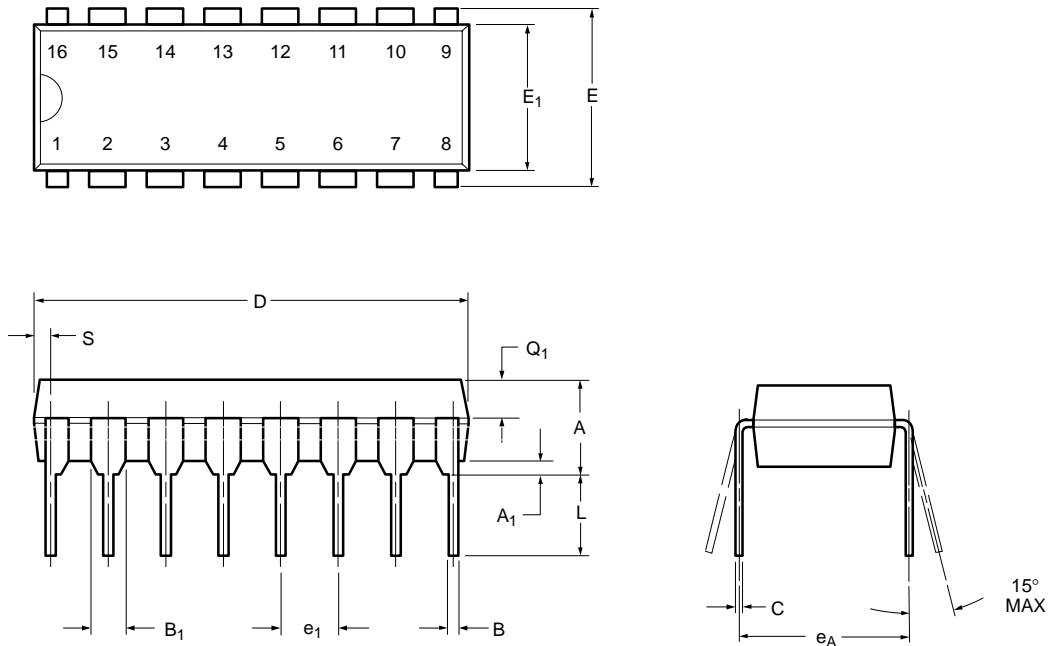


Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A <sub>1</sub>	0.10	0.20	0.004	0.008
B	0.38	0.51	0.015	0.020
C	0.18	0.23	0.007	0.009
D	9.80	10.00	0.385	0.393
E	3.80	4.00	0.149	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
L	0.50	0.93	0.020	0.037
⌀	0°	8°	0°	8°

ECN: S-03946—Rev. F, 09-Jul-01  
DWG: 5300



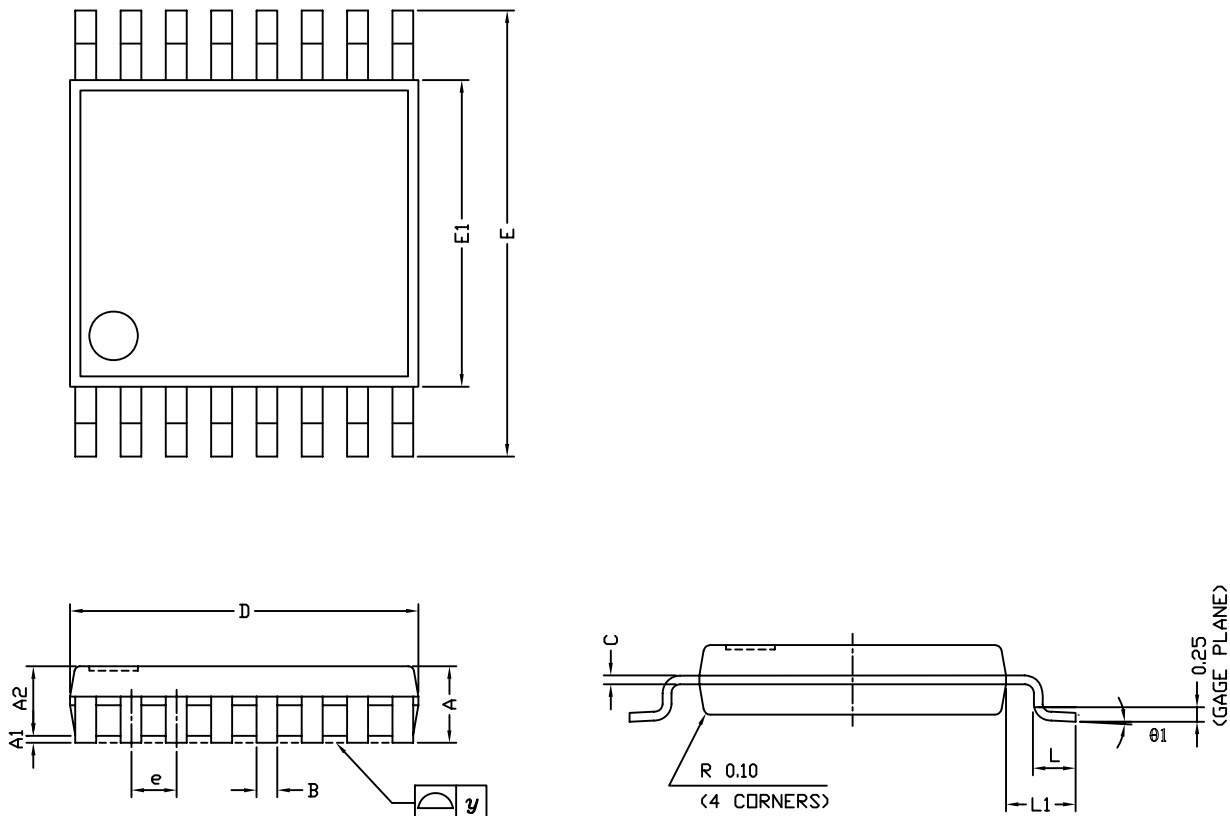
**PDIP: 16-LEAD**



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	3.81	5.08	0.150	0.200
A <sub>1</sub>	0.38	1.27	0.015	0.050
B	0.38	0.51	0.015	0.020
B <sub>1</sub>	0.89	1.65	0.035	0.065
C	0.20	0.30	0.008	0.012
D	18.93	21.33	0.745	0.840
E	7.62	8.26	0.300	0.325
E <sub>1</sub>	5.59	7.11	0.220	0.280
e <sub>1</sub>	2.29	2.79	0.090	0.110
e <sub>A</sub>	7.37	7.87	0.290	0.310
L	2.79	3.81	0.110	0.150
Q <sub>1</sub>	1.27	2.03	0.050	0.080
S	0.38	1.52	.015	0.060

ECN: S-03946—Rev. D, 09-Jul-01  
DWG: 5482

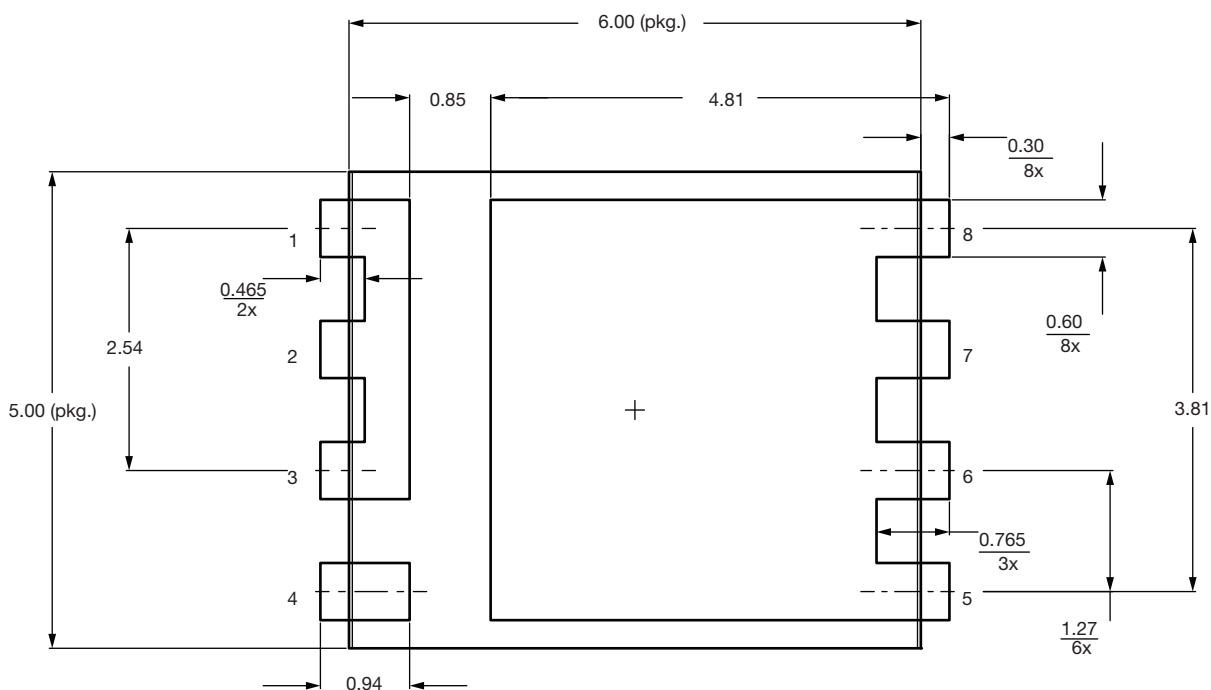
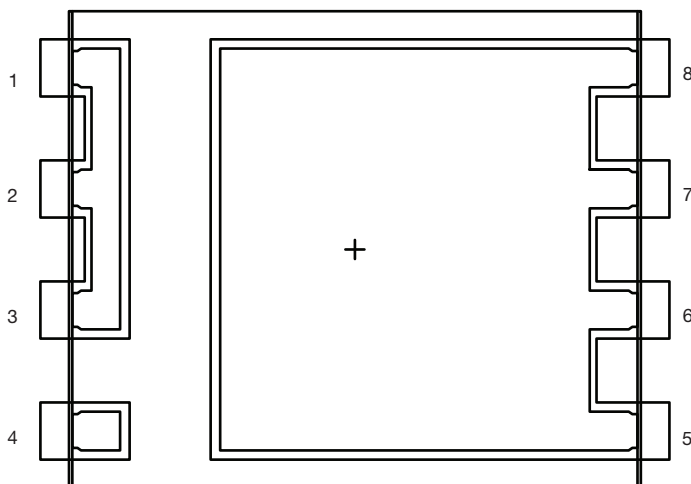
## TSSOP: 16-LEAD



Symbols	DIMENSIONS IN MILLIMETERS		
	Min	Nom	Max
A	-	1.10	1.20
A1	0.05	0.10	0.15
A2	-	1.00	1.05
B	0.22	0.28	0.38
C	-	0.127	-
D	4.90	5.00	5.10
E	6.10	6.40	6.70
E1	4.30	4.40	4.50
e	-	0.65	-
L	0.50	0.60	0.70
L1	0.90	1.00	1.10
y	-	-	0.10
θ1	0°	3°	6°
ECN: S-61920-Rev. D, 23-Oct-06			
DWG: 5624			



## Recommended Land Pattern PowerPAK® SO-8SW (PKSO8SWSCL)

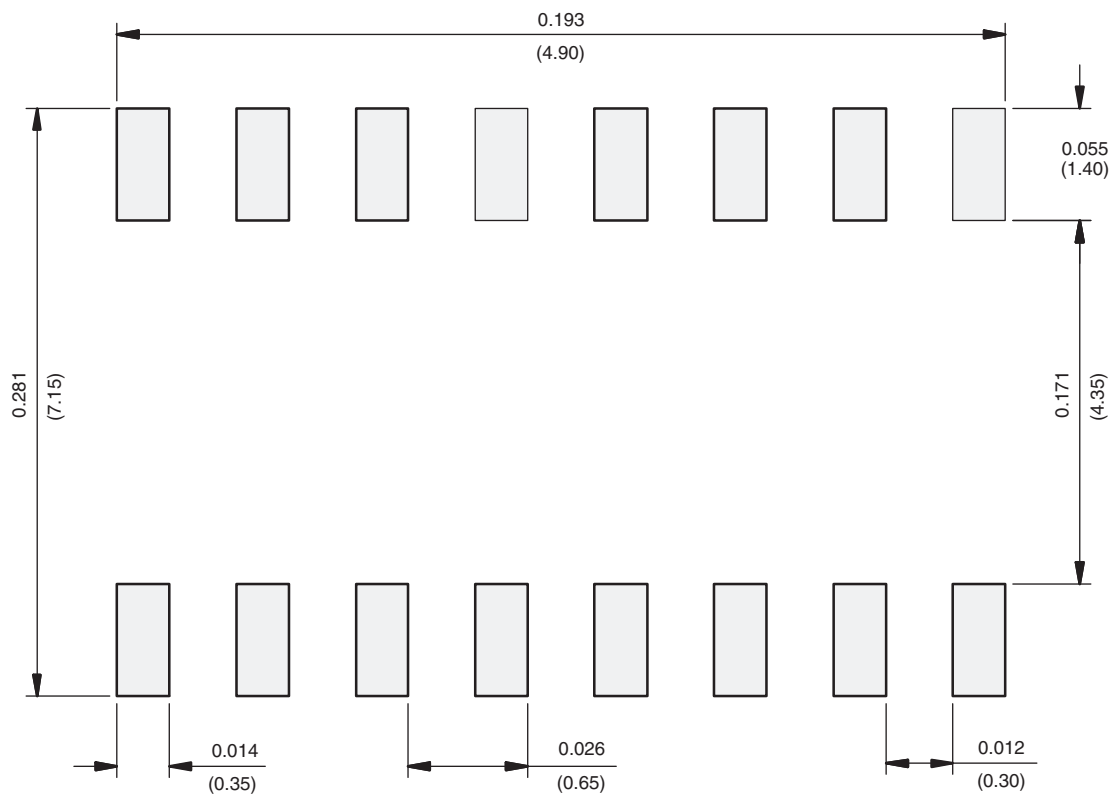

**Note**

- Dimensions in mm

ECN: C24-0483-Rev. A, 20-May-2024  
DWG: 3027



## RECOMMENDED MINIMUM PAD FOR TSSOP-16



Recommended Minimum Pads  
Dimensions in inches (mm)



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