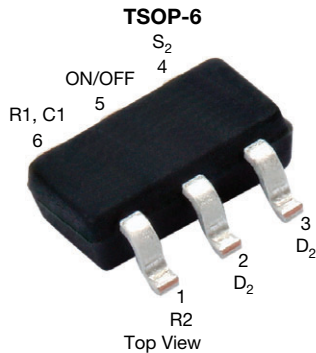


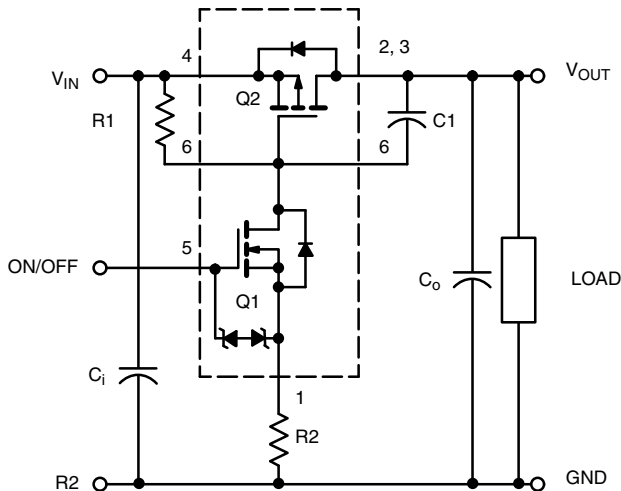
Load Switch with Level-Shift



Marking Code: IK

PRODUCT SUMMARY	
V_{DS} (V)	12
$R_{DS(on)}$ (Ω) at $V_{IN} = 4.5$ V	0.054
$R_{DS(on)}$ (Ω) at $V_{IN} = 2.5$ V	0.077
$R_{DS(on)}$ (Ω) at $V_{IN} = 1.8$ V	0.106
$R_{DS(on)}$ (Ω) at $V_{IN} = 1.5$ V	0.165
I_D (A)	± 2.8
Configuration	Level-shift

APPLICATION CIRCUITS



COMPONENTS		
R1	Pull-up resistor	Typical 10 k Ω to 1 M Ω ^a
R2	Optional slew-rate control	Typical 0 to 100 k Ω ^a
C1	Optional slew-rate control	Typical 1000 pF

Note

- a. Minimum R1 value should be at least 10 x R2 to ensure Q1 turn-on

FEATURES

- Low $R_{DS(on)}$ TrenchFET®: 1.5 V rated
- 1.5 V to 12 V input
- 1.8 V to 8 V logic level control
- Low profile, small footprint TSOP-6 package
- 2100 V ESD protection on input switch, $V_{ON/OFF}$
- Adjustable slew-rate
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

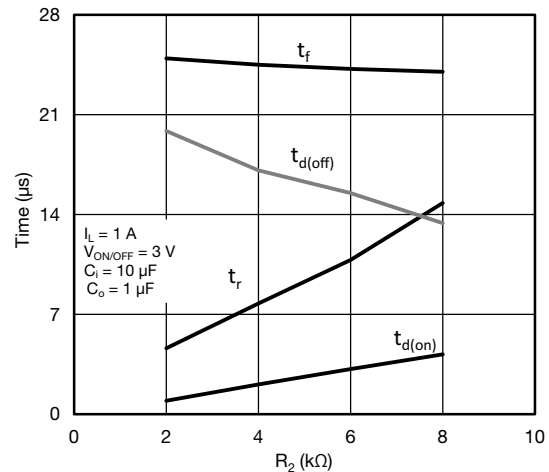

RoHS
 COMPLIANT
 HALOGEN
 FREE

APPLICATIONS

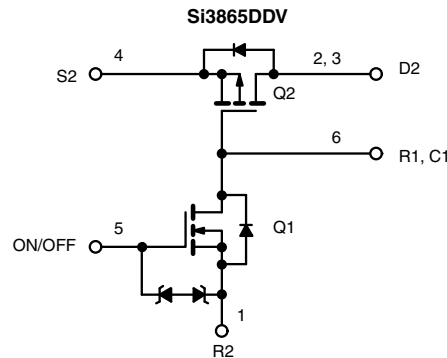
- Load switch with level-shift gate drive
- Slew-rate control
- Portable / consumer devices

DESCRIPTION

The Si3865DDV includes a p- and n-channel MOSFET in a single TSOP-6 package. The low on-resistance p-channel TrenchFET is tailored for use as a load switch. The n-channel, with an external resistor, can be used as a level-shift to drive the p-channel load-switch. The n-channel MOSFET has internal ESD protection and can be driven by logic signals as low as 1.8 V. The Si3865DDV operates on supply lines from 1.5 V to 12 V, and can drive loads up to 2.8 A.



The Si3865DDV is ideally suited for high-side load switching in portable applications. The integrated n-channel level-shift device saves space by reducing external components. The slew rate is set externally so that rise-times can be tailored to different load types.

FUNCTIONAL BLOCK DIAGRAM


ORDERING INFORMATION	
Package	TSOP-6
Lead (Pb)-free and halogen-free	Si3865DDV-T1-GE3

ABSOLUTE MAXIMUM RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Input voltage	$V_{IN}(V_{DS2})$	12	V
On/off voltage	$V_{ON/OFF}$	8	
Load current	Continuous ^{a, b}	± 2.8	A
	Pulsed ^{b, c}	± 6	
Continuous intrinsic diode conduction ^a	I_S	-1	
Maximum power dissipation ^a	P_D	0.83	W
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$
ESD rating, MIL-STD-883D human body model (100 pF, 1500 Ω)	ESD	2	kV

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient (continuous current) ^a	R_{thJA}	130	150	$^\circ\text{C}/\text{W}$
Maximum junction-to-foot (Q2)	R_{thJF}	75	90	

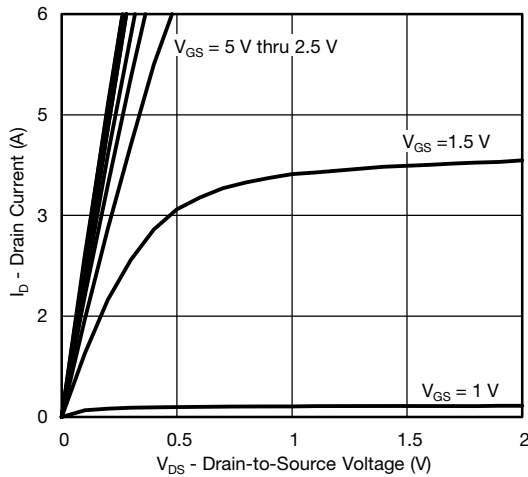
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Off Characteristics							
Reverse leakage current	I_{FL}	$V_{IN} = 12\text{ V}, V_{ON/OFF} = 0\text{ V}$	-	-	1	μA	
Diode forward voltage	V_{SD}	$I_S = -1\text{ A}$	-	-0.77	-1	V	
On Characteristics							
Input voltage range	V_{IN}		1.5	-	12	V	
On-resistance (p-channel) at 1 A	$R_{DS(on)}$	$V_{ON/OFF} = 1.8\text{ V}, I_D = 1\text{ A}$	$V_{IN} = 4.5\text{ V}$	-	0.045	0.054	Ω
			$V_{IN} = 2.5\text{ V}$	-	0.063	0.077	
			$V_{IN} = 1.8\text{ V}$	-	0.085	0.106	
			$V_{IN} = 1.5\text{ V}$	-	0.110	0.165	
On-state (p-channel) drain-current	$I_{D(on)}$	$V_{IN-OUT} \leq 0.2\text{ V}, V_{IN} = 5\text{ V}, V_{ON/OFF} = 1.8\text{ V}$	1	-	-	A	
		$V_{IN-OUT} \leq 0.3\text{ V}, V_{IN} = 3\text{ V}, V_{ON/OFF} = 1.8\text{ V}$	1	-	-		

Notes

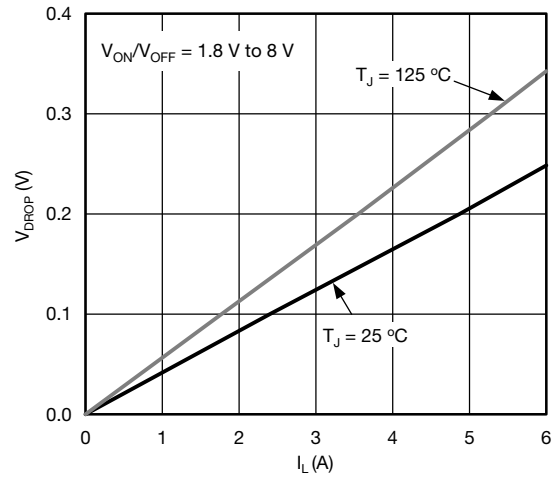
- Surface mounted on FR4 board
- $V_{IN} = 12\text{ V}, V_{ON/OFF} = 8\text{ V}, T_A = 25\text{ }^\circ\text{C}$
- Pulse test: pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

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.

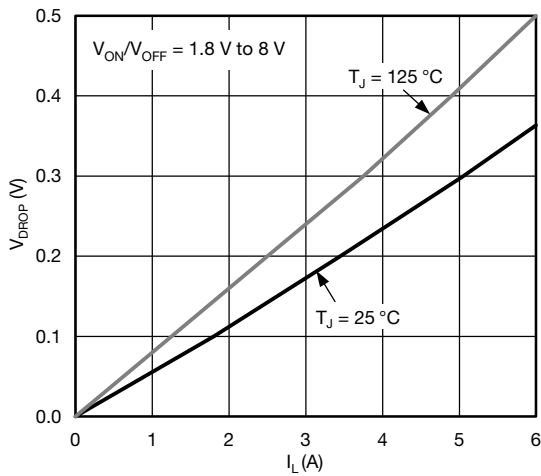
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



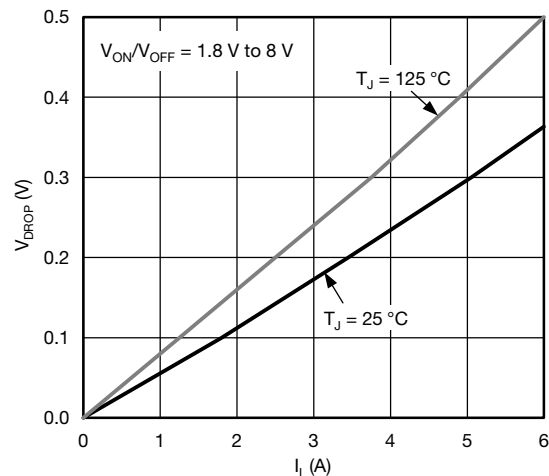
Output Characteristics



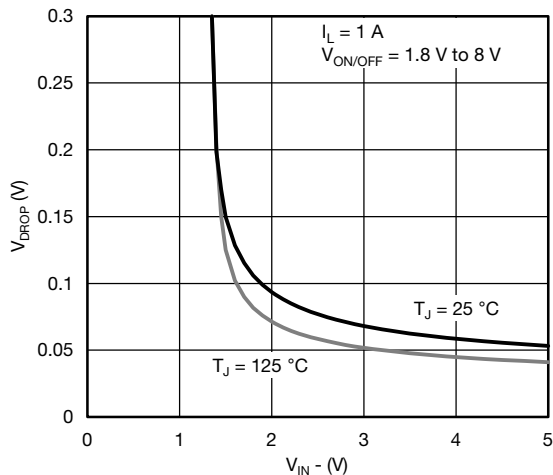
V_{DROP} vs. I_L at $V_{IN} = 4.5$ V



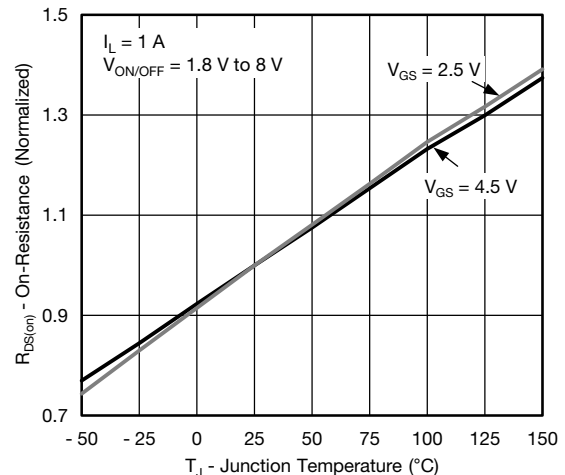
V_{DROP} vs. I_L at $V_{IN} = 2.5$ V



V_{DROP} vs. I_L at $V_{IN} = 1.8$ V



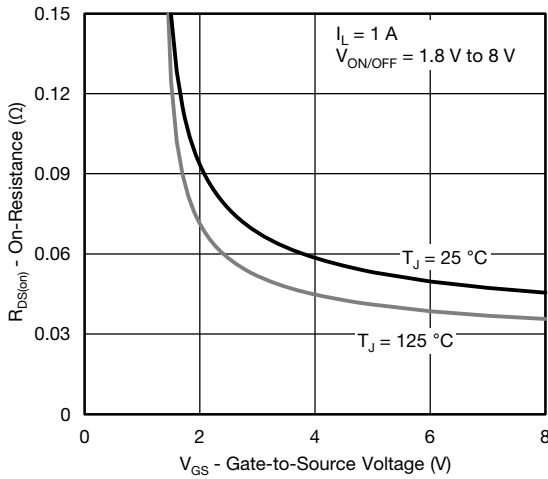
V_{DROP} vs. V_{IN} at $I_L = 1$ A



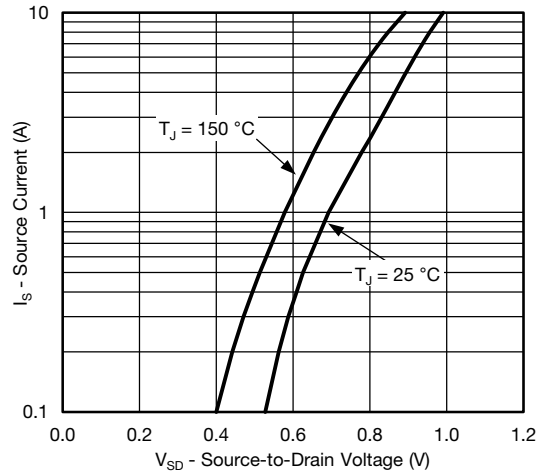
Normalized On-Resistance vs. Junction Temperature



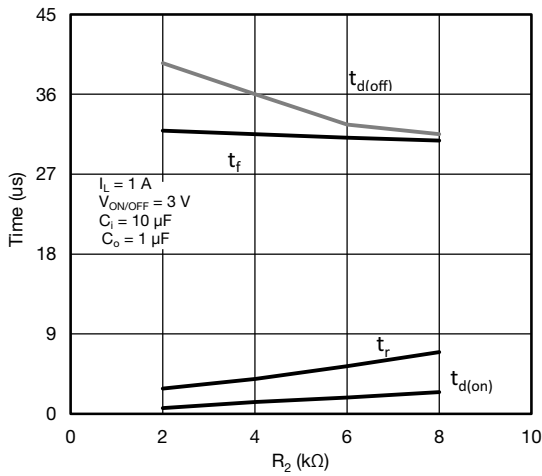
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



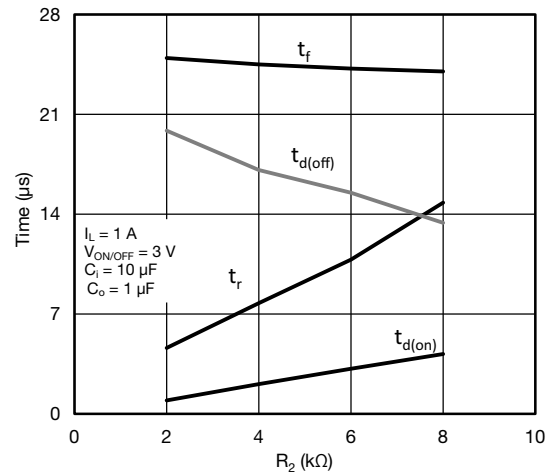
On-Resistance vs. Input Voltage



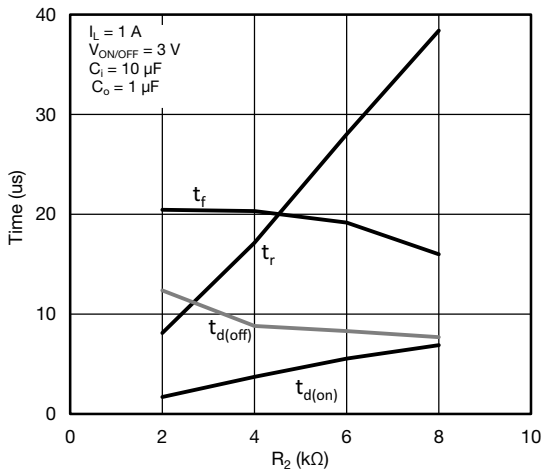
Source-Drain Diode Forward Voltage



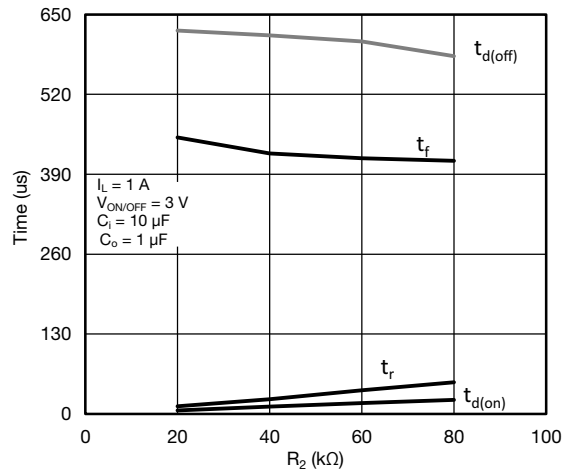
Switching Variation R2 at V_{IN} = 4.5 V, R1 = 20 kΩ



Switching Variation R2 at V_{IN} = 2.5 V, R1 = 20 kΩ

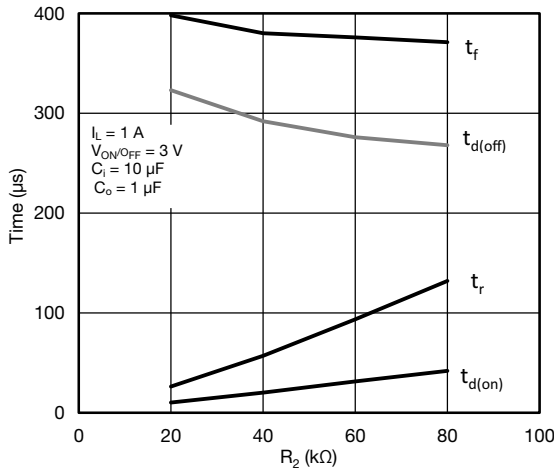


Switching Variation R2 at V_{IN} = 1.8 V, R1 = 20 kΩ

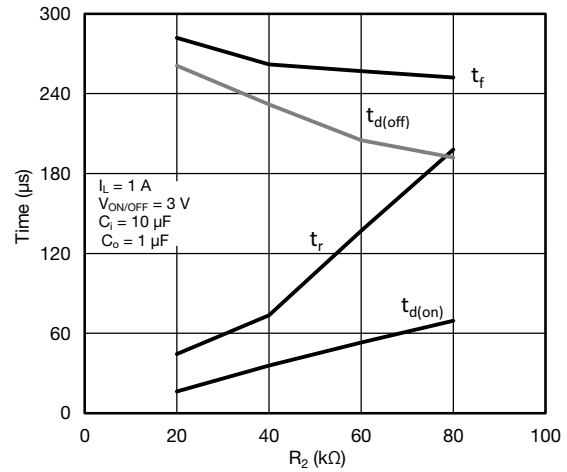


Switching Variation R2 at V_{IN} = 4.5 V, R1 = 300 kΩ

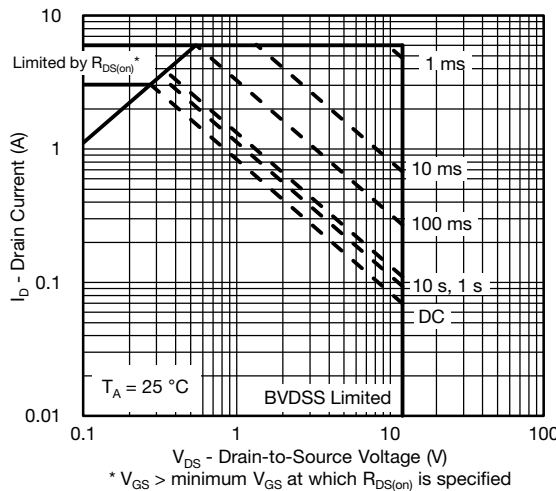
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



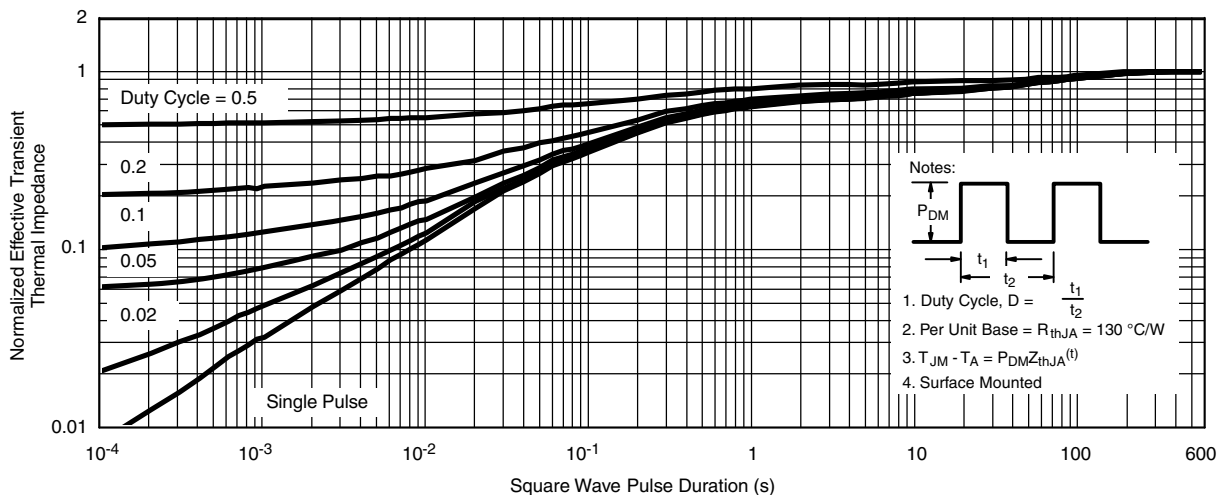
Switching Variation R2 at $V_{IN} = 2.5\text{ V}$, $R_1 = 300\text{ k}\Omega$



Switching Variation R2 at $V_{IN} = 1.8\text{ V}$, $R_1 = 300\text{ k}\Omega$



Safe Operating Area, Junction-to-Foot



Normalized Thermal Impedance, Junction-to-Ambient

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TSOP: 5/6-LEAD

JEDEC Part Number: MO-193C



5-LEAD TSOP



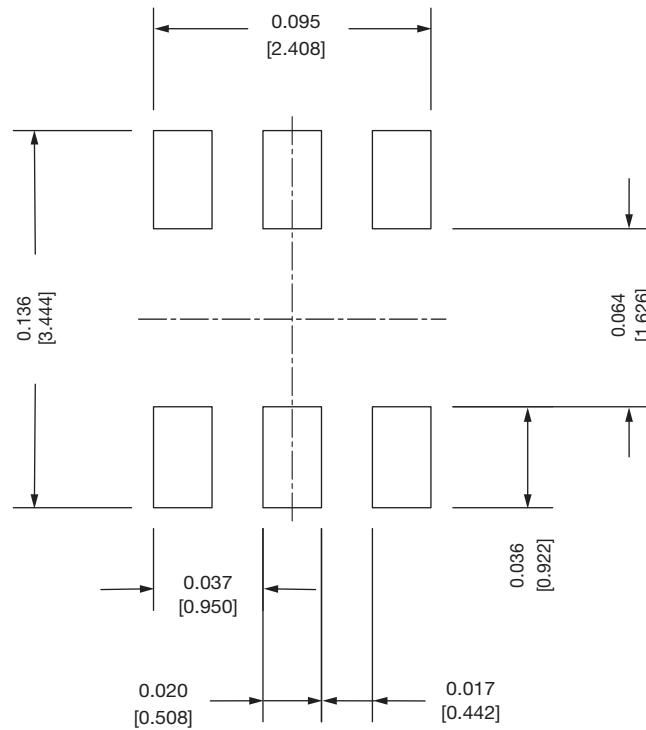
6-LEAD TSOP



Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.91	-	1.10	0.036	-	0.043
A ₁	0.01	-	0.10	0.0004	-	0.004
A ₂	0.90	-	1.00	0.035	0.038	0.039
b	0.30	0.32	0.45	0.012	0.013	0.018
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.95	3.05	3.10	0.116	0.120	0.122
E	2.70	2.85	2.98	0.106	0.112	0.117
E ₁	1.55	1.65	1.70	0.061	0.065	0.067
e	0.95 BSC			0.0374 BSC		
e ₁	1.80	1.90	2.00	0.071	0.075	0.079
L	0.32	-	0.50	0.012	-	0.020
L ₁	0.60 Ref			0.024 Ref		
L ₂	0.25 BSC			0.010 BSC		
R	0.10	-	-	0.004	-	-
θ	0°	4°	8°	0°	4°	8°
θ ₁	7° Nom			7° Nom		
ECN: C-06593-Rev. I, 18-Dec-06						
DWG: 5540						



Recommended Land Pattern For TSOP-5L / TSOP-6L



Note

- All dimensions are in inches (millimeter)

ECN: C22-0860-Rev. B, 24-Oct-2022
 DWG: 3010



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