

800mA Low Dropout Regulator

Features

- Adjustable Output Low to 0.5V
- Input Voltage as Low as 1.0V at V_{PP} 5V
- 200mV Dropout @ 0.8A, V_{PP} 3.6V
- Over Current and Over Temperature Protection
- Enable Pin
- Low Reverse Leakage (Output to Input)
- SOT-23-6, SOP-8 (FD), TDFN2X2-8 and TDFN3X2-8 Packages with Thermal Pad
- $\pm 2\%$ Output Voltage
- VO Pull Low Resistance when Disable

Applications

- Motherboards
- Peripheral Cards
- Network Cards
- Set Top Boxes
- Notebook Computers

General Description

The G940 is a high performance positive voltage regulator designed for use in applications requiring very low Input voltage and very low dropout voltage at up to 0.8 amps. It operates with a V_{IN} as low as 1V and V_{PP} voltage 5V with output voltage programmable as low as 0.5V. The G940 features ultra low dropout, ideal for applications where V_{OUT} is very close to V_{IN} . Additionally, the G940 has an enable pin to further reduce power dissipation while shutdown. The G940 provides excellent regulation over variations in line, load and temperature.

The G940 is available in the SOT-23-6, SOP-8 (FD), TDFN2X2-8 and TDFN3X2-8 package. It is available with outputs that are adjustable using external resistors.

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G940TB1U	940x	-40°C~+85°C	SOT-23-6
G940F11U	G940	-40°C~+85°C	SOP-8 (FD)
G940RC1D	940	-40°C~+85°C	TDFN2X2-8
G940KC1G	940	-40°C~+85°C	TDFN3X2-8
G940KC1D	940	-40°C~+85°C	TDFN3X2-8

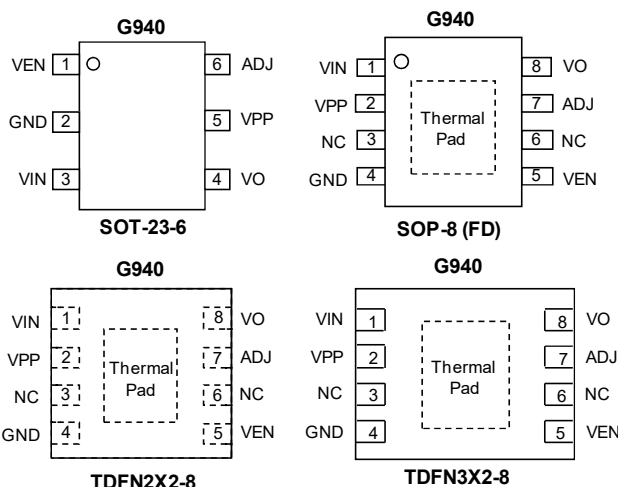
Note: TB: SOT-23-6 F1: SOP-8 (FD) RC:TDFN2X2-8 KC: TDFN3X2-8

1: Bonding Code

U, G & D: Tape & Reel

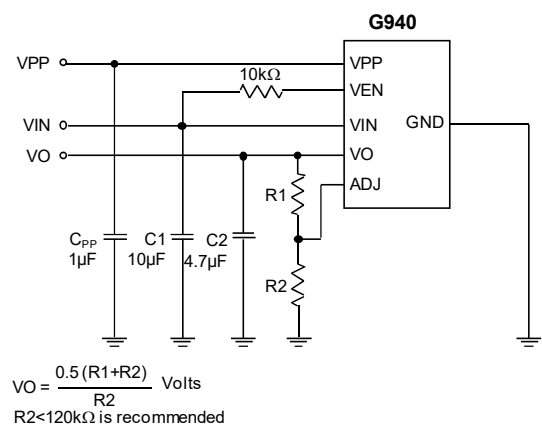
Green : Lead Free / Halogen Free

Pin Configuration



Note: Recommend connecting the Thermal Pad to the Ground for excellent power dissipation.

Typical Application Circuit



Absolute Maximum Ratings (Note 1)

V_{PP} , V_{IN} , Input Voltage	7V
Power Dissipation Internally Limited (Note 2)	
Maximum Junction Temperature	150°C
Storage Temperature Range	-65°C $\leq T_J \leq$ +150°C
Reflow Temperature (soldering, 10sec)	260°C
Thermal Resistance Junction to Ambient, (θ_{JA})*	
SOT-23-6	260°C/W
SOP-8 (FD)	130°C/W
TDFN2X2-8	300°C/W
TDFN3X2-8	201°C/W
Continuous Power Dissipation ($T_A = +25^\circ\text{C}$)*	
SOT-23-6	0.52W

SOP-8 (FD)	0.95W
TDFN2X2-8	0.4W
TDFN3X2-8	0.57W
Thermal Resistance Junction to Case, (θ_{JC})	
SOT-23-6	60°C/W
SOP-8 (FD)	12°C/W
TDFN2X2-8	70°C/W
TDFN3X2-8	63°C/W
ESD Rating (Human Body Model)	2kV

Operation Conditions

V_{IN} Voltage	1V ~5.5V
V_{PP} Voltage	2.7V~5.5V
Temperature Range	-40°C $\leq T_A \leq$ +85°C

* Please refer to Minimum Footprint PCB Layout Section.

Electrical Characteristic

$V_{PP}=3.6\text{V}$, $V_{IN}=1.5\text{V}$, $V_O=1.2\text{V}$, $V_{EN}=V_{PP}$, $I_O=10\text{mA}$, $C_{IN}=10\mu\text{F}$, $C_{OUT}=4.7\mu\text{F}$, $T_A=T_J=25^\circ\text{C}$.

The device is not guaranteed to function outside its operating conditions. Parameters with MIN and/or MAX limits are 100% tested at +25°C, unless otherwise specified.

PARAMETER	SYMBOL	CONDITION		MIN	TYP	MAX	UNIT
VIN							
Input Voltage Range	VIN	VO=0.8V		1.0	---	5.5	V
		VO=0.7V		0.9	---	5.5	V
Quiescent Current (Ground Current)	IQ	VO=1.2V		---	---	20	µA
VPP							
VPP Voltage Range	VPP			2.7	---	5.5	V
VPP Current	IPP	IO=10µA, VO=1.2V		---	---	300	µA
VO							
Output Voltage	VO	VO=VADJ=0.5V, 1mA to 800mA		0.49	0.5	0.51	V
		VO=VADJ =0.5V, -40°C to +85°C		0.487	0.5	0.512	V
Line Regulation, VIN		VIN=1V to 5.5V, VPP =3.6V, IO=1mA, VO=0.5V		---	0.002	---	%/V
Line Regulation, VPP		VIN=1.5V, VPP =2.7V to 5.5V, IO=100mA, VO =0.5V		---	0.04	---	%/V
Load Regulation		IO=1mA to 800mA		---	0.0005	---	%/mA
Dropout Voltage	VD	VPP=3.6V, IO=800mA		---	---	200	mV
Current Limit	ILIM			0.8	1.3	1.9	A
PSRR	PSRR	VO=1.5V VIN=VO+1V IO=50mA	f=1kHz	---	65	---	dB
			f=10kHz	---	49	---	
			f=100kHz	---	33	---	
ADJ							
Adjust Pin Current	IADJ			---	20	100	nA
VEN							
VEN Pin Voltage High	VENH	VPP=3.6V		1.3	---	---	V
VEN Pin Voltage Low	VENL	VPP=3.6V		---	---	0.8	V
VEN Pin Bias Current	IENL	VEN=1.2		-1	---	+1	µA
Over Temperature Protection							
Over Temperature	TOT			---	155	---	°C
Over Temperature Hysteresis	TOTHY			---	30	---	°C

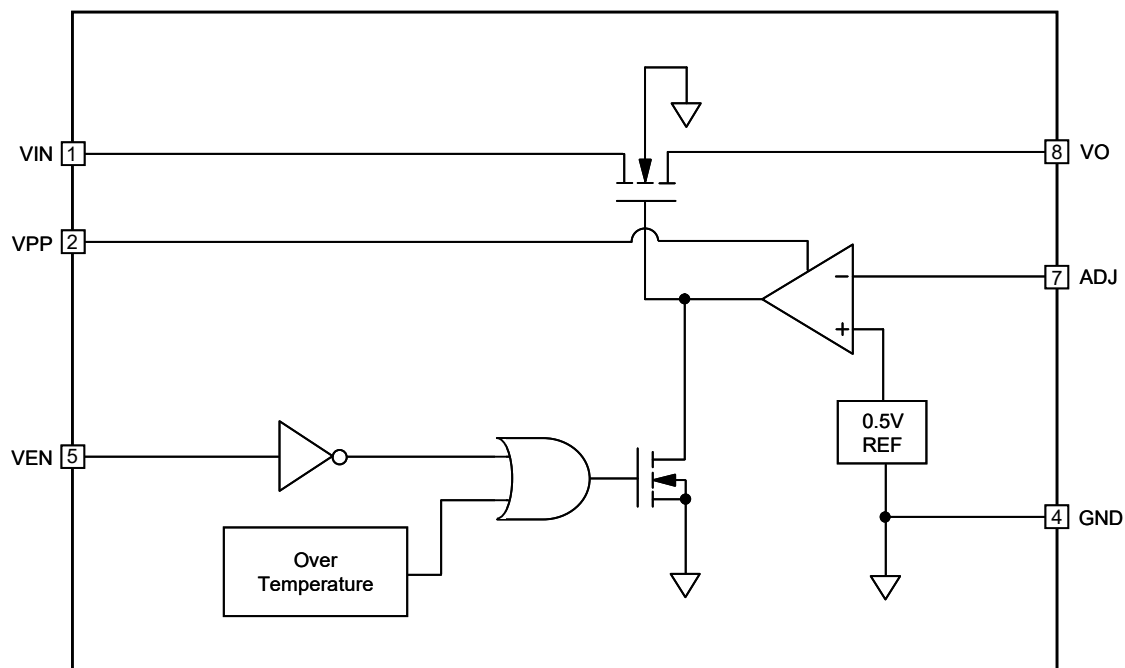
Note 1: Absolute Maximum Ratings are limits beyond which damage to the device may occur. Operating Conditions are conditions under which the device functions but the specifications might not be guaranteed. For guaranteed specifications and test conditions see the Electrical Characteristics.

Note2: The maximum power dissipation is a function of the maximum junction temperature, T_{Jmax} ; total thermal resistance, θ_{JA} , and ambient temperature T_A . The maximum allowable power dissipation at any ambient temperature is $(T_{Jmax}-T_A)/\theta_{JA}$. If this dissipation is exceeded, the die temperature will rise above 150°C and IC will go into thermal shutdown.

Pin Description

PIN			NAME	FUNCTION
SOT-23-6	SOP-8 (FD)	TDFN2X2-8/ TDFN3X2-8		
1	5	5	VEN	Enable Input. Pulling this pin below 0.8V turns the regulator off, reducing the quiescent current to a fraction of its operating value.
2	4	4	GND	Reference ground.
3	1	1	VIN	Input voltage. Large bulk capacitance should be placed closely to this pin. A 10 μ F ceramic capacitor is recommended at this pin.
4	8	8	VO	The power output of the device.
5	2	2	VPP	Input voltage for controlling circuit.
6	7	7	ADJ	This pin, when grounded, sets the output voltage by the internal feedback resistors. If external feedback resistors are used, the output voltage will be $VO = 0.5(R1+R2)/R2 \text{ Volts.}$
--	3,6	3,6	NC	Not connected.

Block Diagram



Definitions

Dropout Voltage

The input/output Voltage differential at which the regulator output no longer maintains regulation against further reductions in input voltage. Measured when the output drops 2% below its nominal value, dropout voltage is affected by junction temperature, load current and minimum input supply requirements.

Line Regulation

The change in output voltage for a change in input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that average chip temperature is not significantly affected.

Load Regulation

The change in output voltage for a change in load current at constant chip temperature. The measurement is made under conditions of low dissipation or by using pulse techniques such that average chip temperature is not significantly affected.

Maximum Power Dissipation

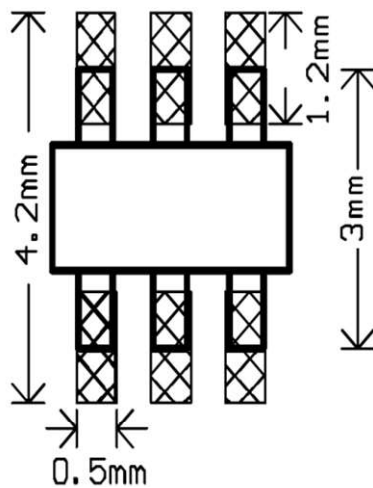
The maximum total device dissipation for which the regulator will operate within specifications.

Quiescent Bias Current

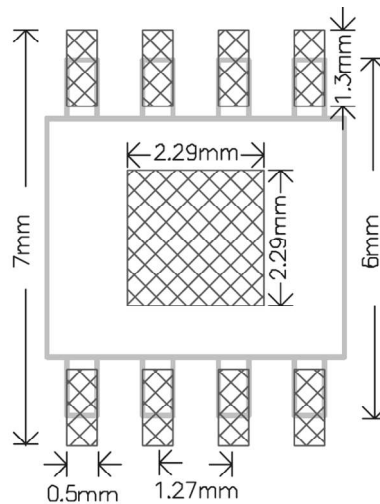
Current which is used to operate the regulator chip and is not delivered to the load.

Minimum Footprint PCB Layout Section

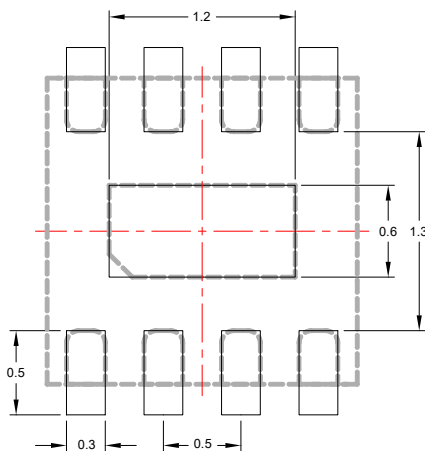
SOT-23-6



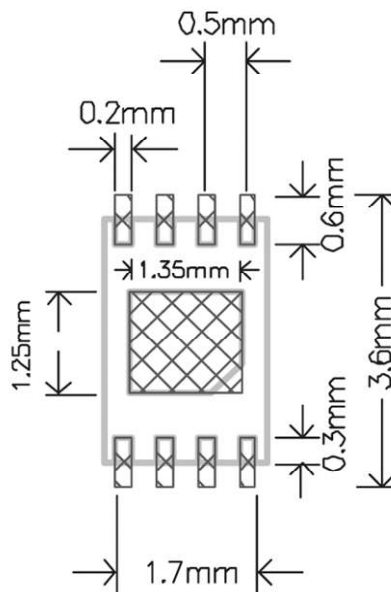
SOP-8 (FD)

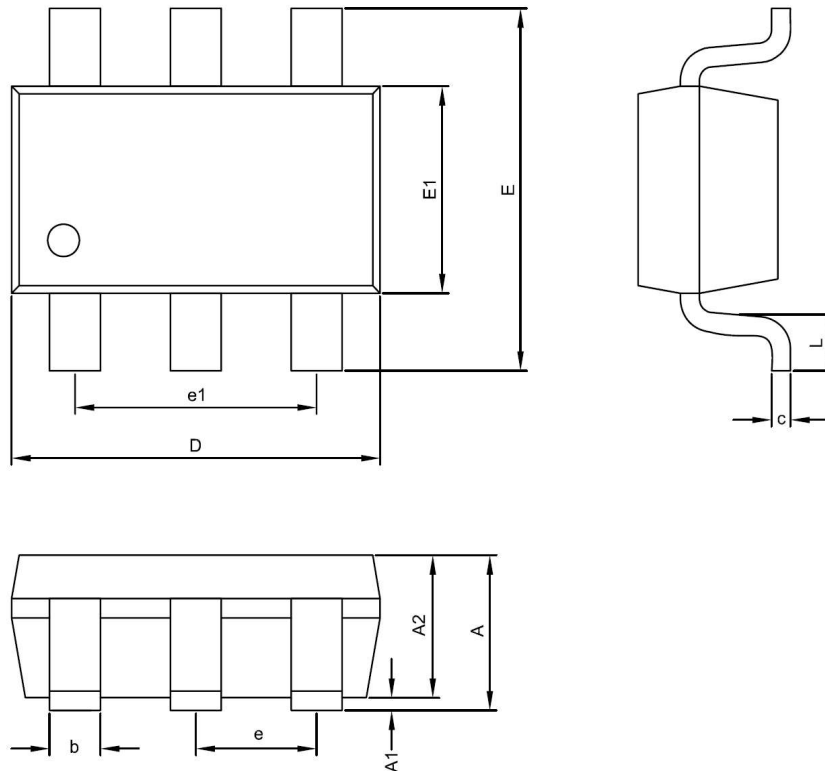


TDFN2X2-8

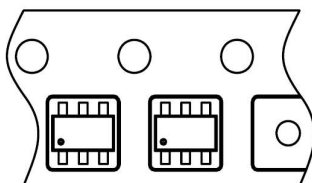


TDFN3X2-8



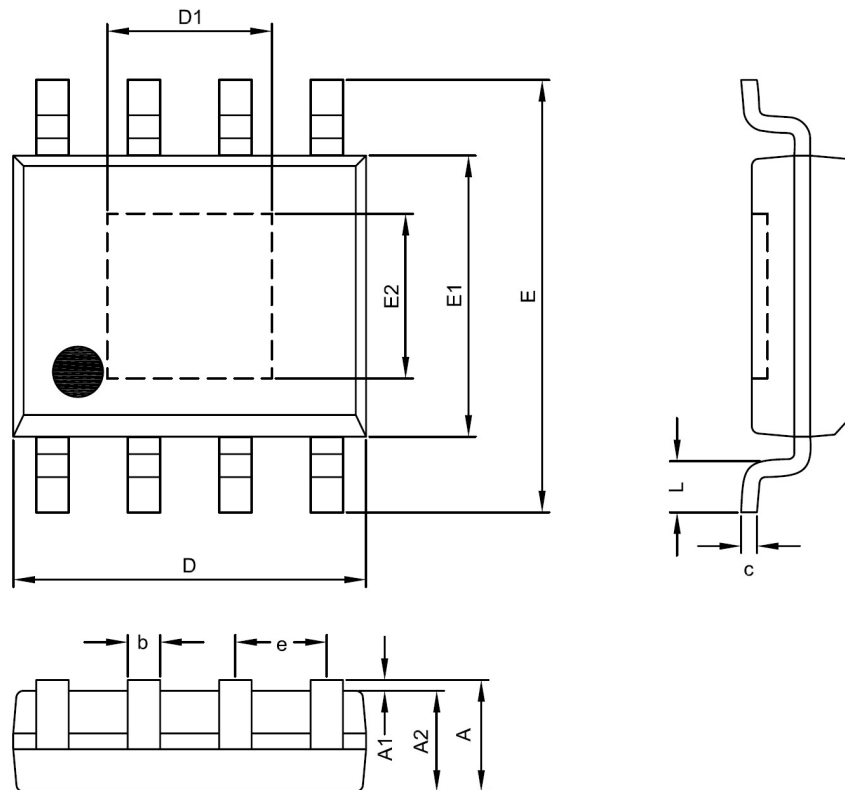
Package Information

SOT-23-6 Package

Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.00	1.10	1.45	0.039	0.043	0.057
A1	0.00	---	0.15	0.000	---	0.006
A2	1.00	1.10	1.30	0.039	0.043	0.051
D	2.70	2.90	3.10	0.106	0.114	0.122
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.50	1.60	1.70	0.059	0.063	0.067
c	0.08	0.15	0.25	0.003	0.006	0.010
b	0.30	0.40	0.50	0.012	0.016	0.020
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.30	0.45	0.60	0.012	0.018	0.024

Taping Specification


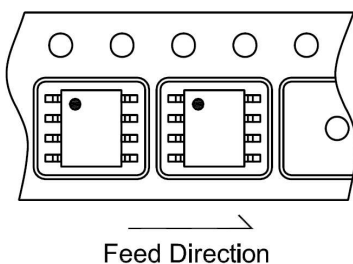
Feed Direction

PACKAGE	Q'TY/REEL
SOT-23-6	3,000 ea

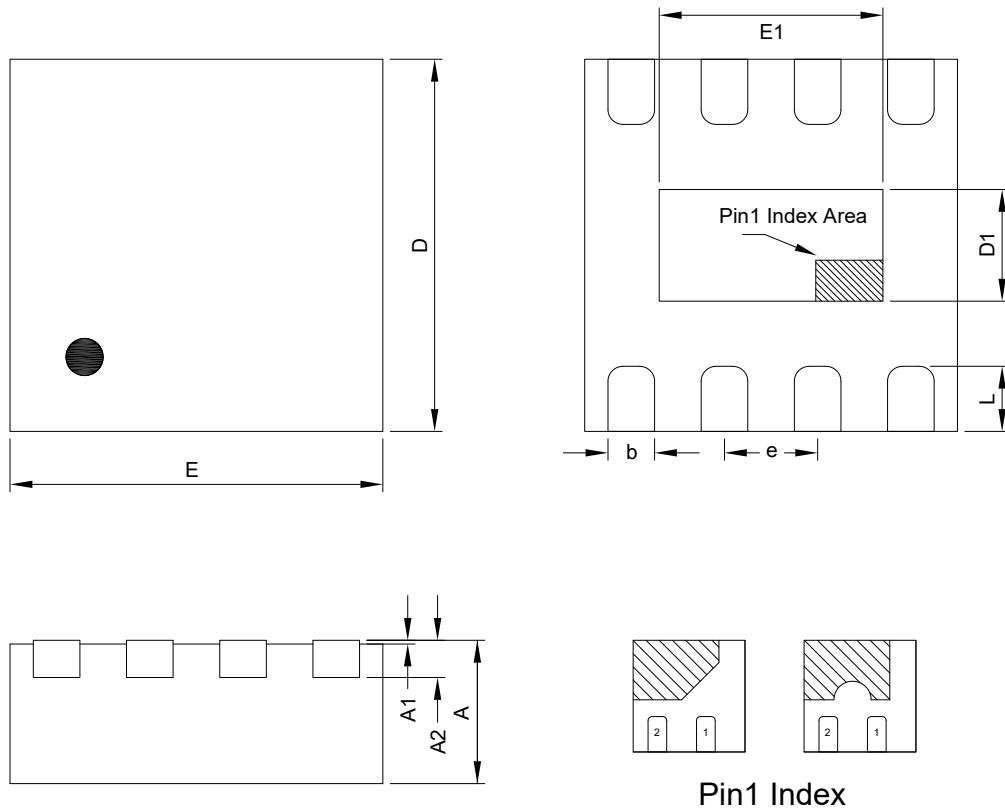

SOP- 8 (FD) Package

Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.35	1.55	1.70	0.053	0.061	0.067
A1	0.00	- - -	0.10	0.000	- - -	0.004
A2	1.15	1.35	1.60	0.045	0.053	0.063
D	4.80	4.90	5.00	0.189	0.192	0.197
D1	2.29 BSC			0.090 BSC		
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.153	0.157
E2	2.29 BSC			0.090 BSC		
c	0.20 REF			0.008 REF		
b	0.33	0.43	0.53	0.013	0.017	0.021
e	1.27 BSC			0.050 BSC		
L	0.40	0.70	1.27	0.016	0.028	0.050

Taping Specification



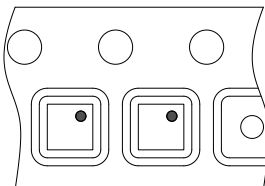
PACKAGE	Q'TY/REEL
SOP-8 (FD)	2,500 ea



TDFN2X2-8 Package

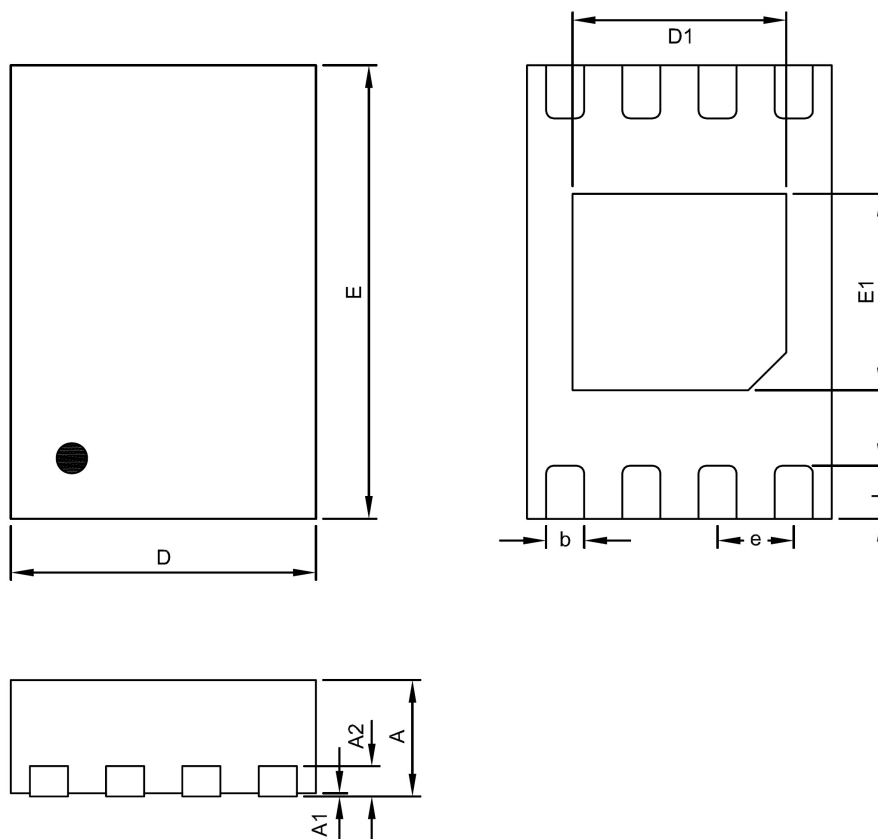
Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.0276	0.0295	0.0315
A1	0.00	---	0.05	0.0000	---	0.0020
A2	0.20 REF			0.0079 REF		
D	1.95	2.00	2.05	0.0768	0.0787	0.0807
E	1.95	2.00	2.05	0.0768	0.0787	0.0807
D1	0.55	0.65	0.75	0.0217	0.0256	0.0295
E1	1.15	1.25	1.35	0.0453	0.0492	0.0531
b	0.18	0.25	0.30	0.0071	0.0098	0.0118
e	0.50 BSC			0.0197 BSC		
L	0.30	0.35	0.40	0.0118	0.0138	0.0157

Taping Specification



Feed Direction

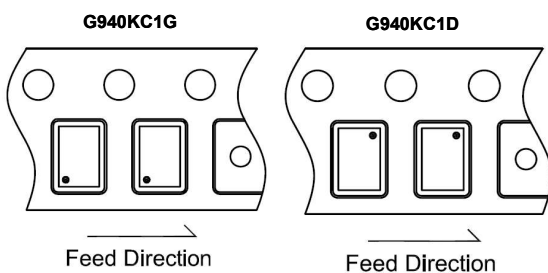
PACKAGE	Q'TY/REEL
TDFN2X2-8	3,000 ea



TDFN3X2-8 Package

Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.0276	0.0295	0.0315
A1	0.00	---	0.05	0.0000	---	0.0020
A2	0.19	0.20	0.21	0.0075	0.0079	0.0083
D	1.95	2.00	2.05	0.0768	0.0787	0.0807
E	2.95	3.00	3.05	0.1161	0.1181	0.1201
D1	1.35	1.40	1.45	0.0531	0.0551	0.0571
E1	1.25	1.30	1.35	0.0492	0.0512	0.0531
b	0.20	0.25	0.30	0.0079	0.0098	0.0118
e	0.50 BSC			0.0197 BSC		
L	0.30	0.35	0.40	0.0118	0.0138	0.0157

Taping Specification



PACKAGE	Q'TY/REEL
TDFN3X2-8	3,000 ea

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