

52 kHz Simple 1A Buck Regulator

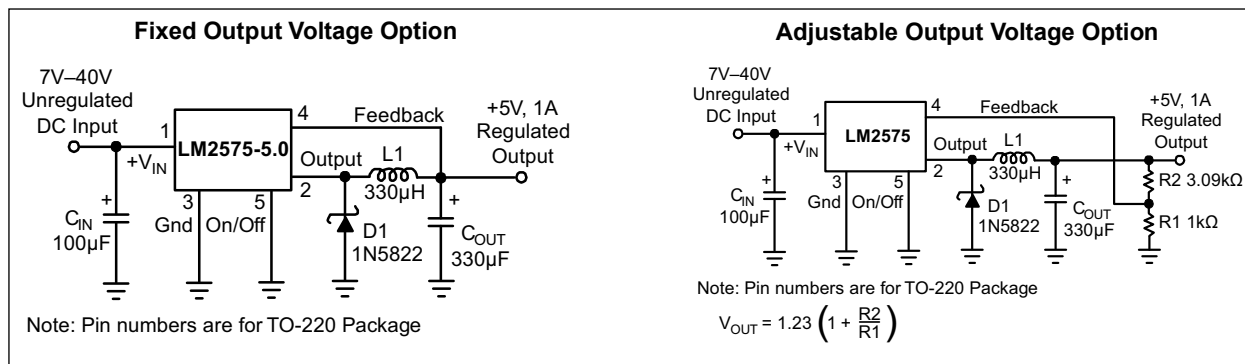
Features

- 3.3V, 5V, 12V, and Adjustable Output Versions
- Voltage over Specified Line and Load Conditions:
 - Fixed Version: $\pm 3\%$ Max. Output Voltage
 - Adjustable Version: $\pm 2\%$ Max. Feedback Voltage
- Ensured 1A Output Current
- Wide Input Voltage Range: 4V to 40V
- Wide Output Voltage Range: 1.23V to 37V
- Requires only Four External Components
- 52 kHz Fixed Frequency Internal Oscillator
- Low Power Standby Mode: I_Q Typically $< 200 \mu A$
- 80% Efficiency (Adjustable Version Typically $> 80\%$)
- Uses Readily Available Standard Inductors
- Thermal Shutdown and Current Limit Protection
- 100% Electrical Thermal Limit Burn-In

Applications

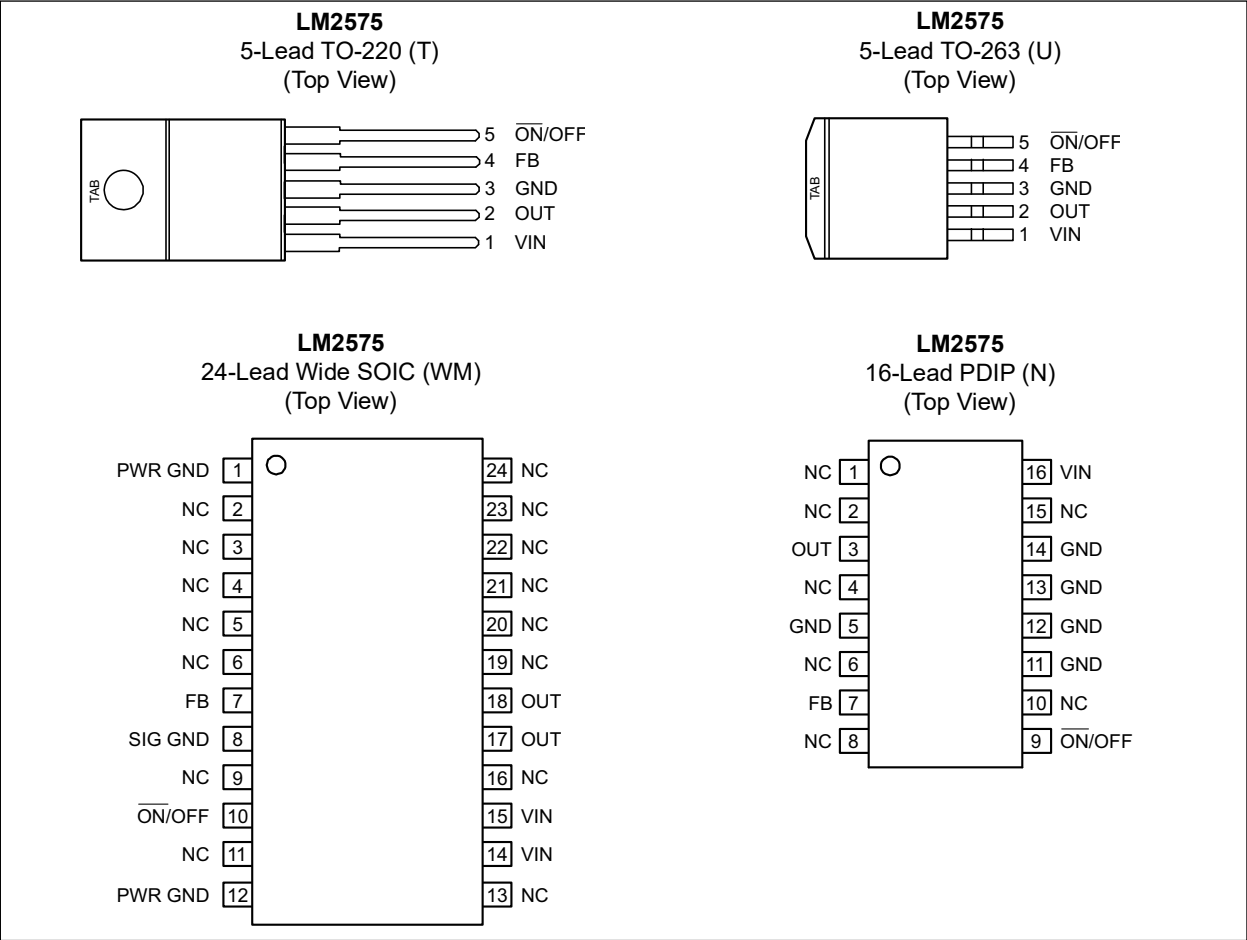
- Simple High-Efficiency Step-Down (Buck) Regulator
- Efficient Pre-Regulator for Linear Regulators
- On-Card Switching Regulators
- Positive-to-Negative Converter (Inverting Buck-Boost)
- Isolated Flyback Converter Using Minimum Number of External Components
- Negative Boost Converter

Typical Application Circuits

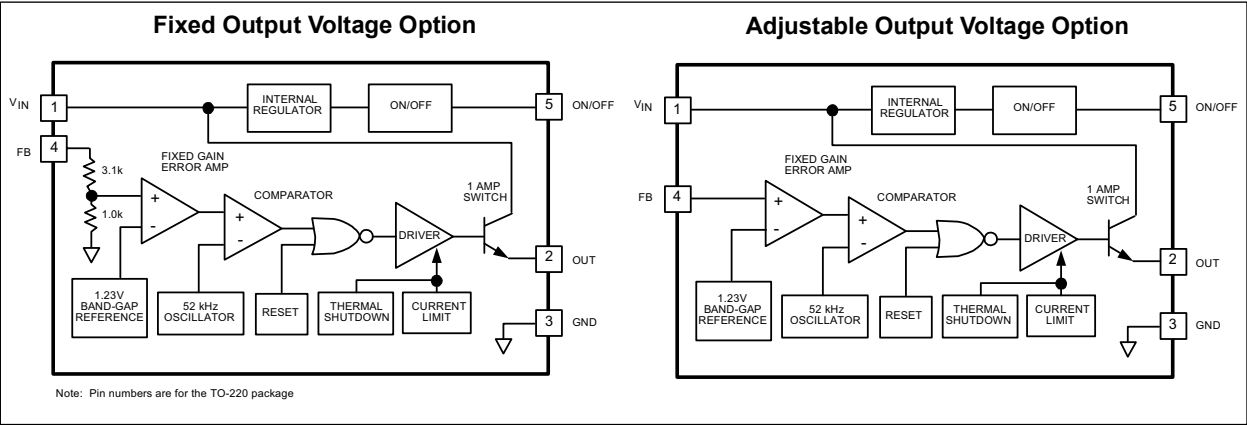


LM2575

Package Types



Functional Block Diagrams



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Maximum Supply Voltage (V_{IN})	+45V
ON/OFF Pin Input Voltage	$-0.3V \leq V \leq +40V$
Output Voltage to Ground (Steady State)	-1V
Power Dissipation	Internally Limited
ESD Rating (Note 1)	2 kV
ESD Rating (FB Pin)	1 kV

Operating Ratings ‡

Supply Voltage (V_{IN})	+40V
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† **Notice:** Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

‡ **Notice:** The device is not guaranteed to function outside its operating ratings.

Note 1: C = 100 pF, R = 1.5kΩ.

ELECTRICAL CHARACTERISTICS

Specifications with standard typeface are for $T_J = +25^\circ\text{C}$, and those with **boldface type** apply over the T_J range of -40°C to $+85^\circ\text{C}$. Unless otherwise specified, $V_{IN} = 12V$ and $I_{LOAD} = 200\text{ mA}$ (Note 1).

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
System Parameters, Adjustable Regulators (Note 2) See Figure 1-1						
Feedback Voltage	V_{FB}	1.217	1.230	1.243	V	$V_{IN} = 12V, I_{LOAD} = 0.2A$ $V_{OUT} = 5V$
		1.193	1.230	1.267	V	$0.2A \leq I_{LOAD} \leq 1A$, $8V \leq V_{IN} \leq 40V, V_{OUT} = 5V$
		1.180	1.230	1.280		
Efficiency	η	—	82	—	%	$V_{IN} = 12V, I_{LOAD} = 1A, V_{OUT} = 5V$
System Parameters, 3.3V Regulators (Note 2) See Figure 1-1						
Output Voltage	V_{OUT}	3.234	3.3	3.366	V	$V_{IN} = 12V, I_{LOAD} = 0.2A$ $V_{OUT} = 3.3V$
		3.168	3.3	3.432	V	$0.2A \leq I_{LOAD} \leq 1A$, $8V \leq V_{IN} \leq 40V, V_{OUT} = 3.3V$
		3.135	3.3	3.465		
Efficiency	η	—	75	—	%	$V_{IN} = 12V, I_{LOAD} = 1A$
System Parameters, 5V Regulators (Note 2) See Figure 1-1						
Output Voltage	V_{OUT}	4.900	5.0	5.100	V	$V_{IN} = 12V, I_{LOAD} = 0.2A$ $V_{OUT} = 5V$
		4.800	5.0	5.200	V	$0.2A \leq I_{LOAD} \leq 1A$, $8V \leq V_{IN} \leq 40V, V_{OUT} = 5V$
		4.750	5.0	5.250		
Efficiency	η	—	82	—	%	$V_{IN} = 12V, I_{LOAD} = 1A$
System Parameters, 12V Regulators (Note 2) See Figure 1-1						
Output Voltage	V_{OUT}	11.760	12.0	12.240	V	$V_{IN} = 25V, I_{LOAD} = 0.2A$ $V_{OUT} = 12V$
		11.520	12.0	12.480	V	$0.2A \leq I_{LOAD} \leq 1A$, $15V \leq V_{IN} \leq 40V, V_{OUT} = 12V$
		11.400	12.0	12.600		
Efficiency	η	—	88	—	%	$V_{IN} = 25V, I_{LOAD} = 1A$

ELECTRICAL CHARACTERISTICS (CONTINUED)

Specifications with standard typeface are for $T_J = +25^\circ\text{C}$, and those with **boldface type** apply over the T_J range of -40°C to $+85^\circ\text{C}$. Unless otherwise specified, $V_{IN} = 12\text{V}$ and $I_{LOAD} = 200\text{ mA}$ ([Note 1](#)).

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Device Parameters, Adjustable Regulator						
Feedback Bias Current	I _{BIAS}	—	50	100	nA	V _{OUT} = 5V
		—	50	500		
Device Parameters, Fixed and Adjustable Regulators						
Oscillator Frequency	f _O	47	52	58	kHz	—
		42	52	63		
Saturation Voltage	V _{SAT}	—	0.9	1.2	V	I _{OUT} = 1A, Note 3
		—	0.9	1.4		
Max Duty Cycle (ON)	DC	93	98	—	%	Note 4
Current Limit	I _{LIM}	1.7	2.2	3.0	A	Peak Current, t _{ON} ≤ 3 μs, Note 3
		1.3	2.2	3.2		
Output Leakage Current Output = 0V	I _L	—	—	2	mA	V _{IN} = 40V, Note 5
Output Leakage Current Output = −1V		—	75	—		—
Output Leakage Current Output = +1V		—	—	30		Note 5
Quiescent Current	I _Q	—	5	10	mA	Note 5
Standby Quiescent Current	I _{STBY}	—	50	200	μA	ON/OFF Pin = 5V (OFF)
ON/OFF Control, Fixed and Adjustable Regulators, See Figure 1-1						
ON/OFF Pin Logic Input Level	V _{IH}	2.2	1.4	—	V	V _{OUT} = 0V
		2.4	1.4	—		
	V _{IL}	—	1.2	1.0		V _{OUT} = 5V
		—	1.2	0.8		
ON/OFF Pin Logic Current	I _{IH}	—	4	30	μA	ON /OFF Pin = 5V (OFF)
	I _{IL}	—	0.01	10	μA	ON /OFF Pin = 0V (ON)

Note 1: All limits ensured at room temperature (standard type face) and at **temperature extremes (bold type face)**. All room temperature limits are 100% production tested. All limits at **temperature extreme** are ensured via testing.

- 2:** External components such as the catch diode, inductor, input and output capacitors can affect switching regulator system performance. When the LM2575 is used as shown in [Figure 1-1](#) test circuit, system performance will be shown in system parameters section of Electrical Characteristics.
- 3:** Output (pin 2) sourcing current. No diode, inductor or capacitor connected to output.
- 4:** Feedback (pin 4) removed from output and connected to 0V.
- 5:** Feedback (pin 4) removed from output and connected to 12V to force the output transistor OFF.

TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Maximum Junction Temperature	$T_{J(MAX)}$	—	—	+150	°C	—
Storage Temperature Range	T_S	–65	—	+150	°C	—
Lead Temperature	T_{LEAD}	—	—	260	°C	Soldering, 10 sec.
Junction Temperature Range	T_J	–40	—	+125	°C	—
Package Thermal Resistances						
Thermal Resistance, TO-220 5-Ld	θ_{JA}	—	65	—	°C/W	Note 1
	θ_{JA}	—	45	—	°C/W	Note 2
	θ_{JC}	—	2	—	°C/W	—
Thermal Resistance, PDIP 16-Ld	θ_{JA}	—	85	—	°C/W	Note 3
Thermal Resistance, Wide SOIC 24-Ld	θ_{JA}	—	100	—	°C/W	Note 3

- Note 1:** Junction to ambient thermal resistance (no external heat sink) for the 5-lead TO-220 package mounted vertically, with 1/2" leads in a socket, or on PC board with minimum copper area.
- 2:** Junction to ambient thermal resistance (no external heat sink) for the 5-lead TO-220 package mounted vertically, with 1/4" leads soldered to PC board containing approximately 4 square inches of copper area surrounding the leads.
- 3:** Junction to ambient thermal resistance with approximately 1 square inch of PC board copper surrounding the leads. Additional copper will lower thermal resistance further.

Test Circuits and Layout Guidelines

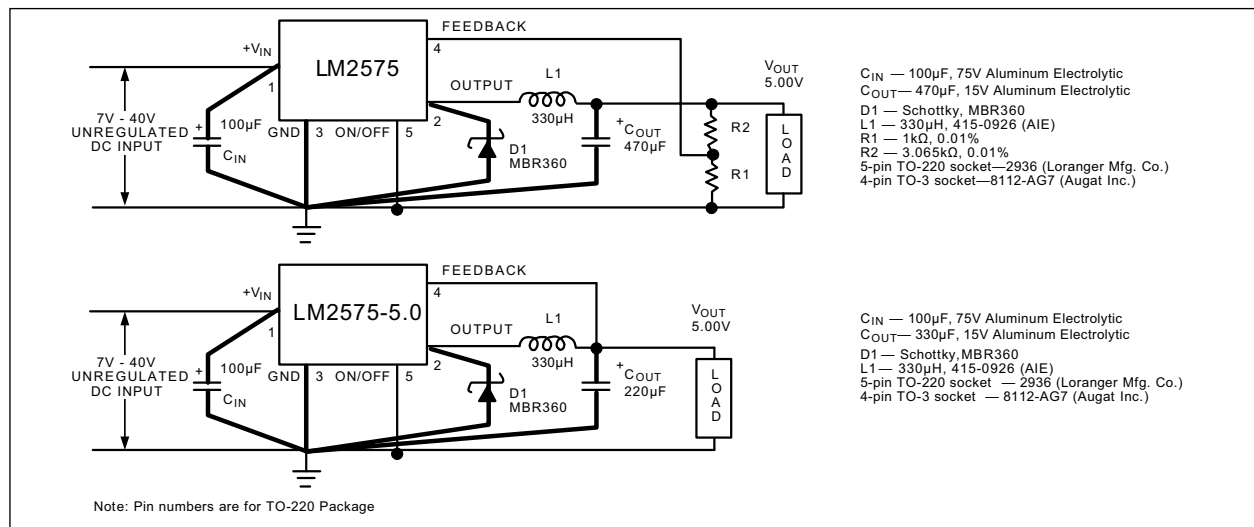


FIGURE 1-1: Test Circuits and Layout Guidelines.

As in any switching regulator, layout is very important. Rapidly switching currents associated with wiring inductance generate voltage transient switches that can cause problems. For minimal stray inductance and ground loops, the length of the leads indicated by heavy lines above should be kept as short as possible. Single-point grounding (as indicated) or ground plane construction should be used for best results.

2.0 TYPICAL PERFORMANCE CURVES

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

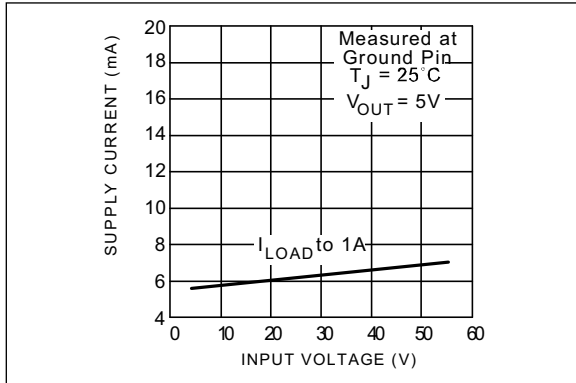


FIGURE 2-1: Supply Current vs. Input Voltage.

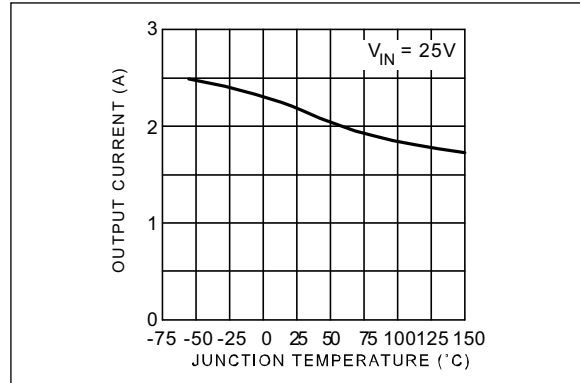


FIGURE 2-4: Current Limit vs. Temperature.

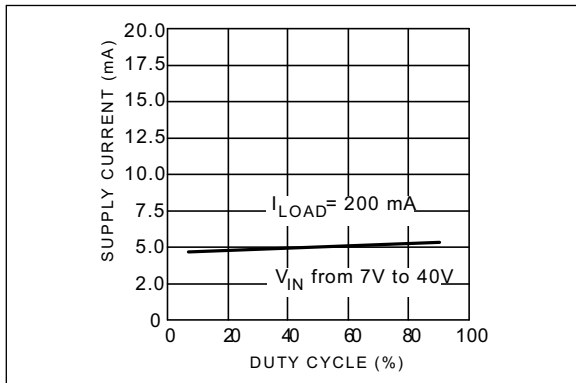


FIGURE 2-2: Supply Current vs. Duty Cycle.

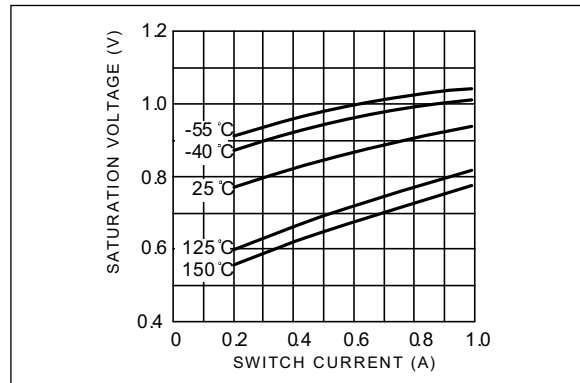


FIGURE 2-5: Switch Saturation Voltage vs. Current.

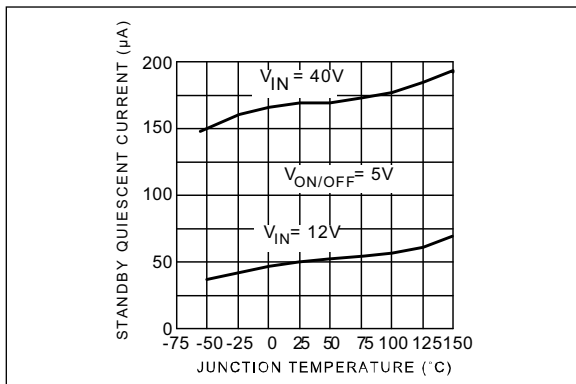


FIGURE 2-3: Standby Quiescent Current vs. Temperature.

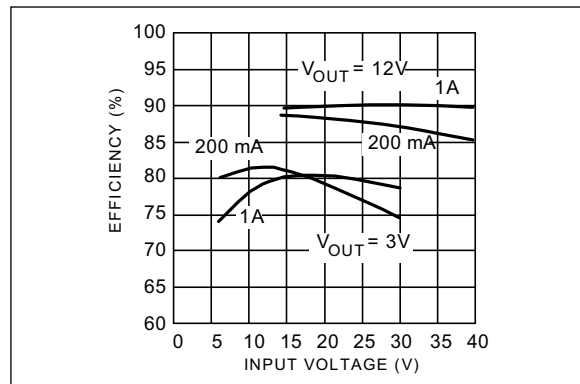


FIGURE 2-6: Efficiency vs. Input Voltage.

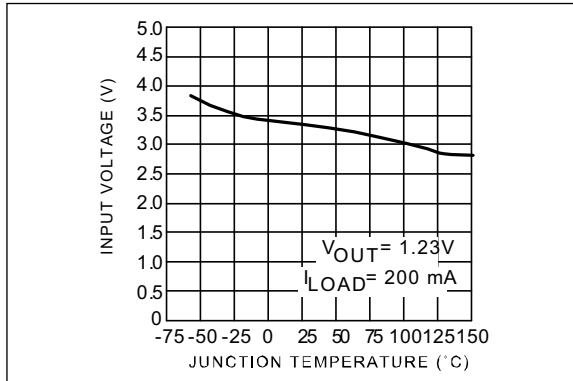


FIGURE 2-7: Minimum Operating Voltage vs. Temperature.

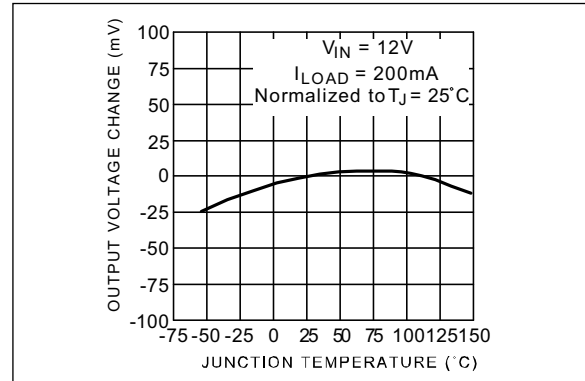


FIGURE 2-10: Normalized Output Voltage vs. Temperature.

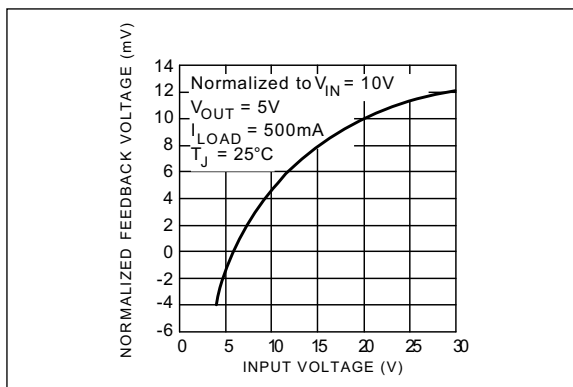


FIGURE 2-8: Line Regulation.

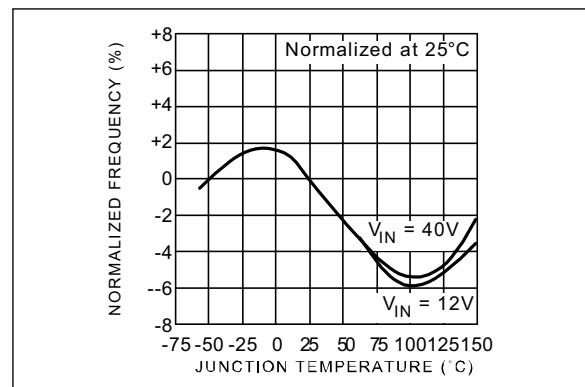


FIGURE 2-11: Normalized Oscillator Frequency vs. Temperature.

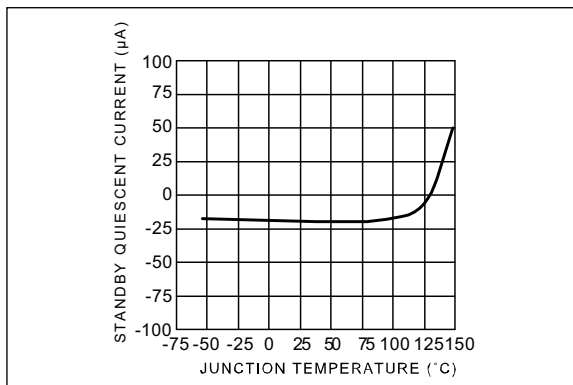


FIGURE 2-9: Feedback Pin Current vs. Temperature.

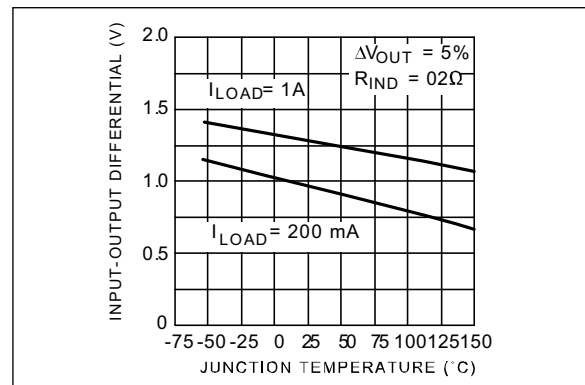


FIGURE 2-12: Dropout Voltage vs. Temperature.

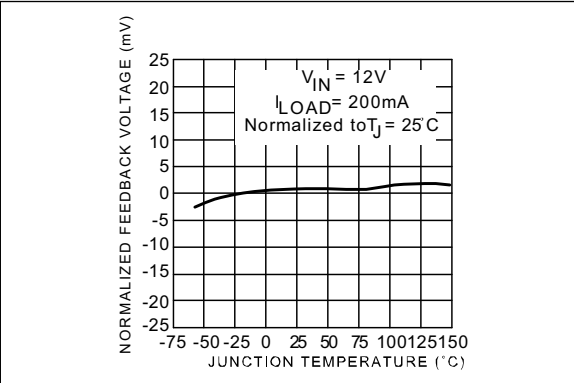


FIGURE 2-13: Normalized Feedback Voltage vs. Temperature (Adjustable Version Only).

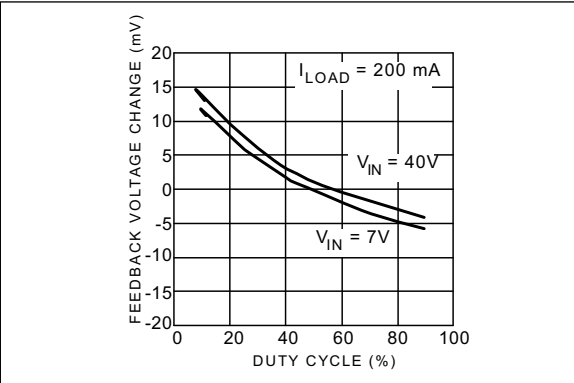


FIGURE 2-14: Feedback Voltage vs. Duty Cycle (Adjustable Version Only).

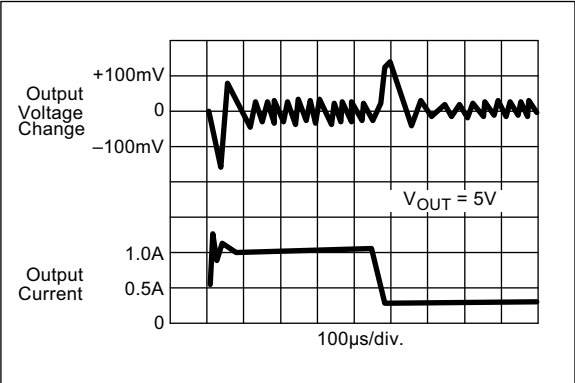


FIGURE 2-15: Load Transient Response.

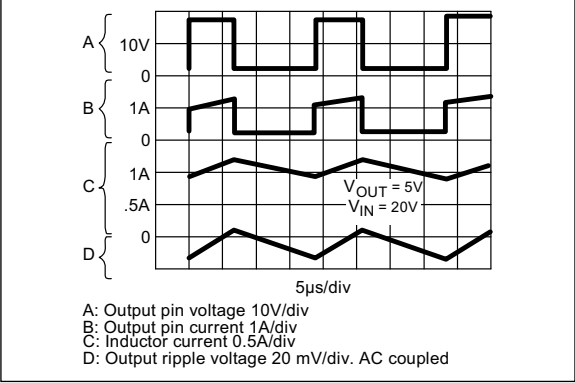
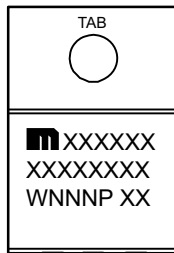


FIGURE 2-16: Switching Waveforms.

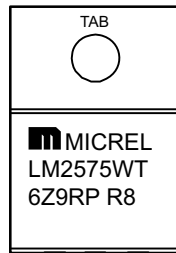
3.0 PACKAGING INFORMATION

3.1 Package Marking Information

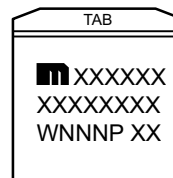
5-Lead TO-220*



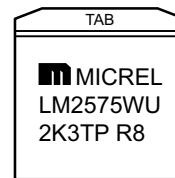
Example



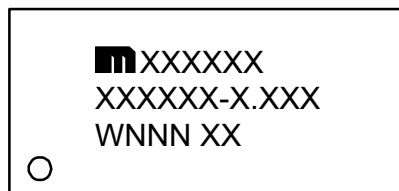
5-Lead TO-263*



Example



16-Lead PDIP*



Example



24-Lead SOIC*



Example



Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.
	•, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.

Underbar (_) and/or Overbar (¯) symbol may not be to scale.

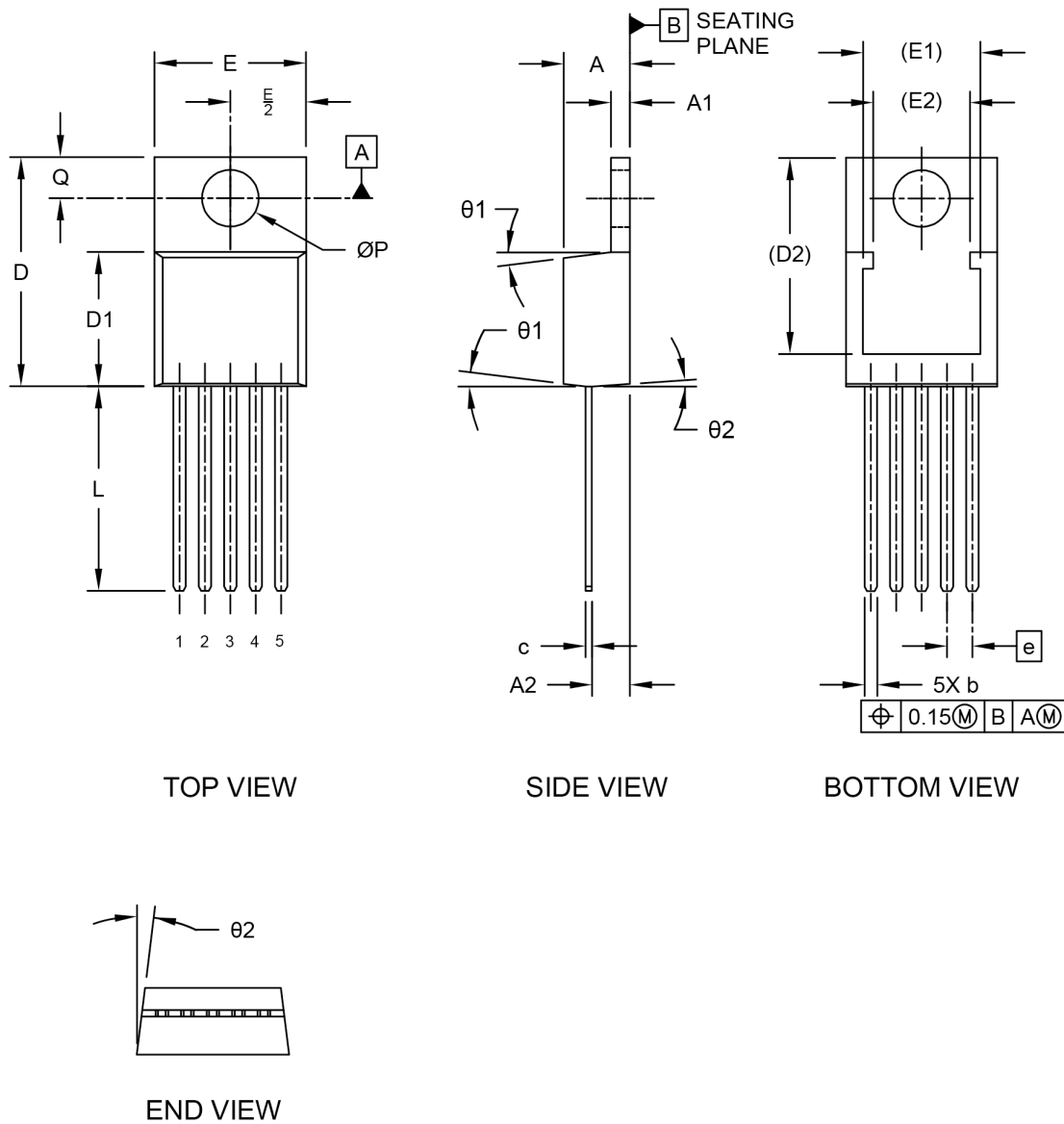
Note: If the full seven-character YYWWNNN code cannot fit on the package, the following truncated codes are used based on the available marking space:

6 Characters = YWWNNN; 5 Characters = WWNNN; 4 Characters = WNNN; 3 Characters = NNN; 2 Characters = NN; 1 Character = N

LM2575

5-Lead Transistor Outline Type LB03 (B8X) - [TO-220] Micrel Legacy Package TO220-LB03-5LD-PL-1

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

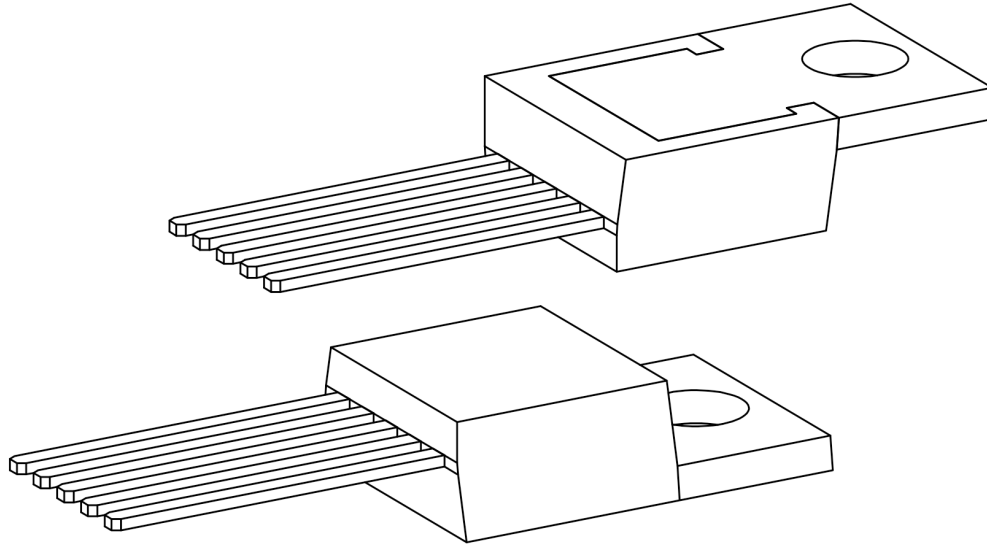


Microchip Technology Drawing C04-036-B8X Rev E Sheet 1 of 2

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5-Lead Transistor Outline Type LB03 (B8X) - [TO-220]
Micrel Legacy Package TO220-LB03-5LD-PL-1

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits		INCHES		
		Min	Nom	Max
Number of Leads	N	5		
Pitch	e	.067 BSC		
Overall Height	A	.160	.175	.190
Tab Height	A1	.045	.050	.055
Seating Plane to Lead	A2	.080	.098	.115
Lead Width	b	.025	.033	.040
Lead Thickness	c	.012	.016	.020
Lead Length	L	.500	.540	.580
Total Body Length Including Tab	D	.542	.580	.619
Molded Body Length	D1	.348	.354	.360
Total Width	E	.380	.400	.420
Pad Width	E1	0.256 REF		
Pad Length	D2	0.486 REF		
Hole Diameter	ØP	.146	.151	.156
Hole Center to Tab Edge	Q	.103	.108	.113
Molded Body Draft Angle	Ø1	3	7	10
Molded Body Draft Angle	Ø2	1	4	7

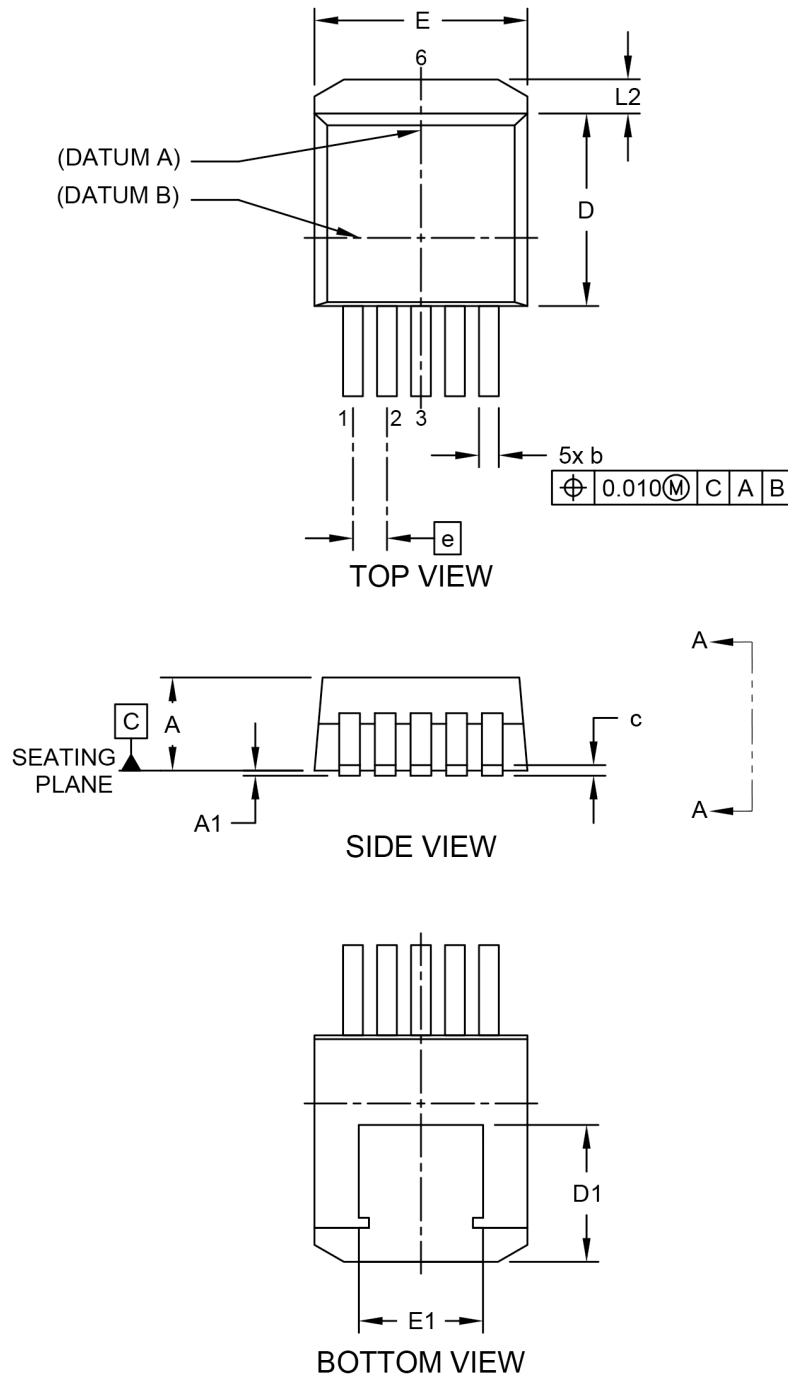
Notes:

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-036-B8X Rev E Sheet 2 of 2

5-Lead Plastic Double Deca-Watt Package (J7X) [DDPAK]

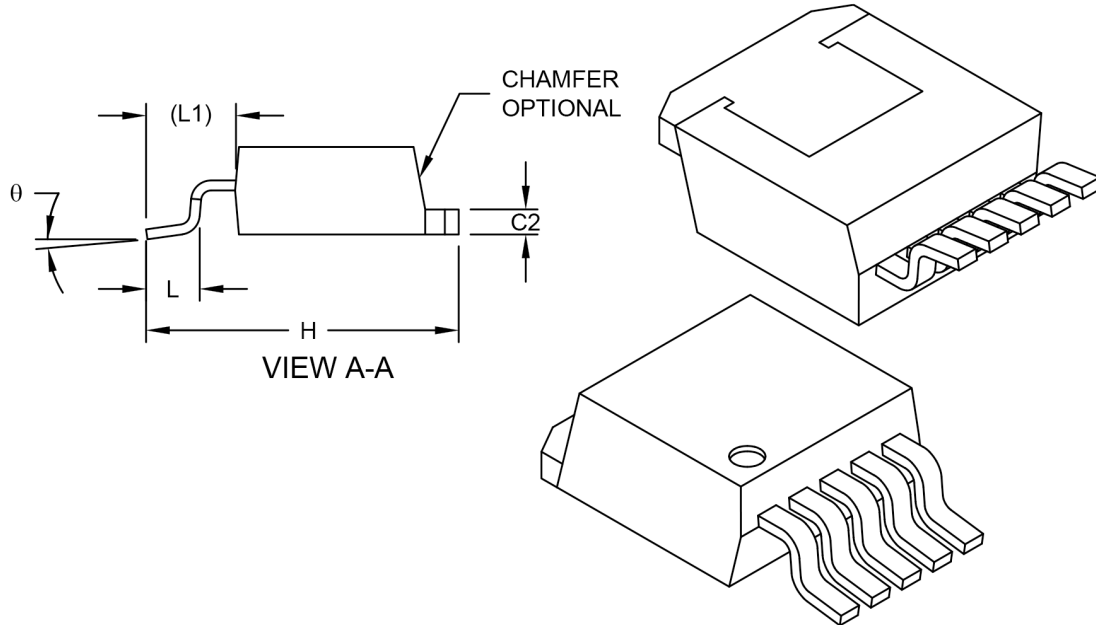
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Microchip Technology Drawing C04-00012 (J7X) Rev E Sheet 1 of 2

5-Lead Plastic Double Deca-Watt Package (J7X) [DDPAK]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Terminals	N	5		
Pitch	e	.067 BSC		
Molded Package Thickness	A	.160	-	.190
Standoff	A1	.000	-	.010
Overall Length	H	.575	-	.625
Overall Width	E	.380	-	.420
Thermal Tab Width	E1	.245	-	-
Molded Package Length	D	.330	-	.380
Thermal Tab Length	D1	.270	-	-
Lead Thickness	c	.015	-	.029
Lead Width	b	.020	-	.039
Thermal Tab Thickness	C2	.045	-	.065
Lead Length	L	.070	-	.110
Foot Print Length	L1	0.13 REF		
Thermal Tab Length	L2	-	-	.066
Foot Angle	θ	0°	-	8°

Notes:

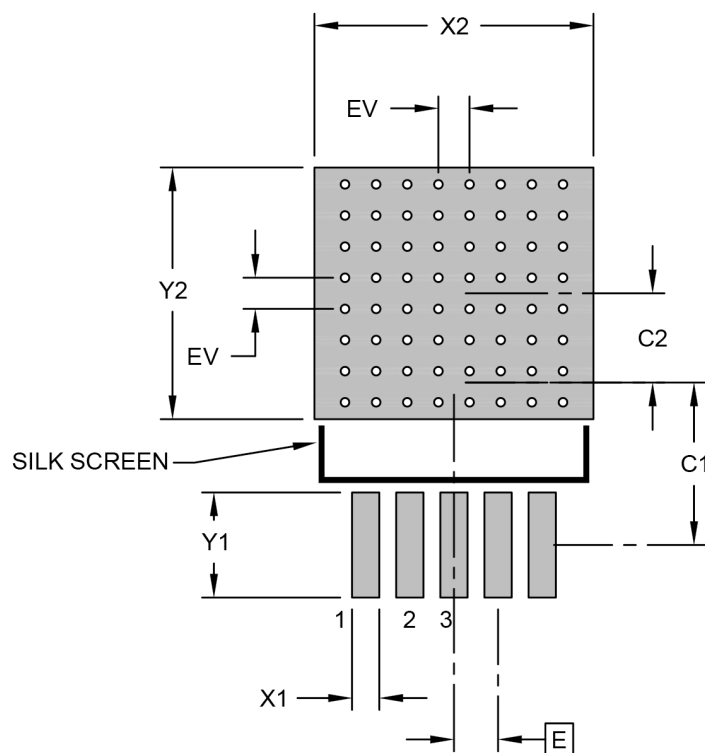
- § Significant Characteristic
- Dimensions D and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
- Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. The theoretically exact value is shown without tolerances.

Microchip Technology Drawing C04-00012 (J7X) Rev E Sheet 2 of 2

5-Lead Plastic Double Deca-Watt Package (J7X) [DDPAK]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	.067 BSC		
Optional Contact Pad Width	X2			.423
Optional Contact Pad Length	Y2			.382
Contact Pad Spacing	C1		.246	
Contact Pad Spacing	C2		.136	
Contact Pad Width (X3)	X1			.041
Contact Pad Length (X3)	Y1			.159
Thermal Via Diameter	V		.013	
Thermal Via Pitch	EV		.047	

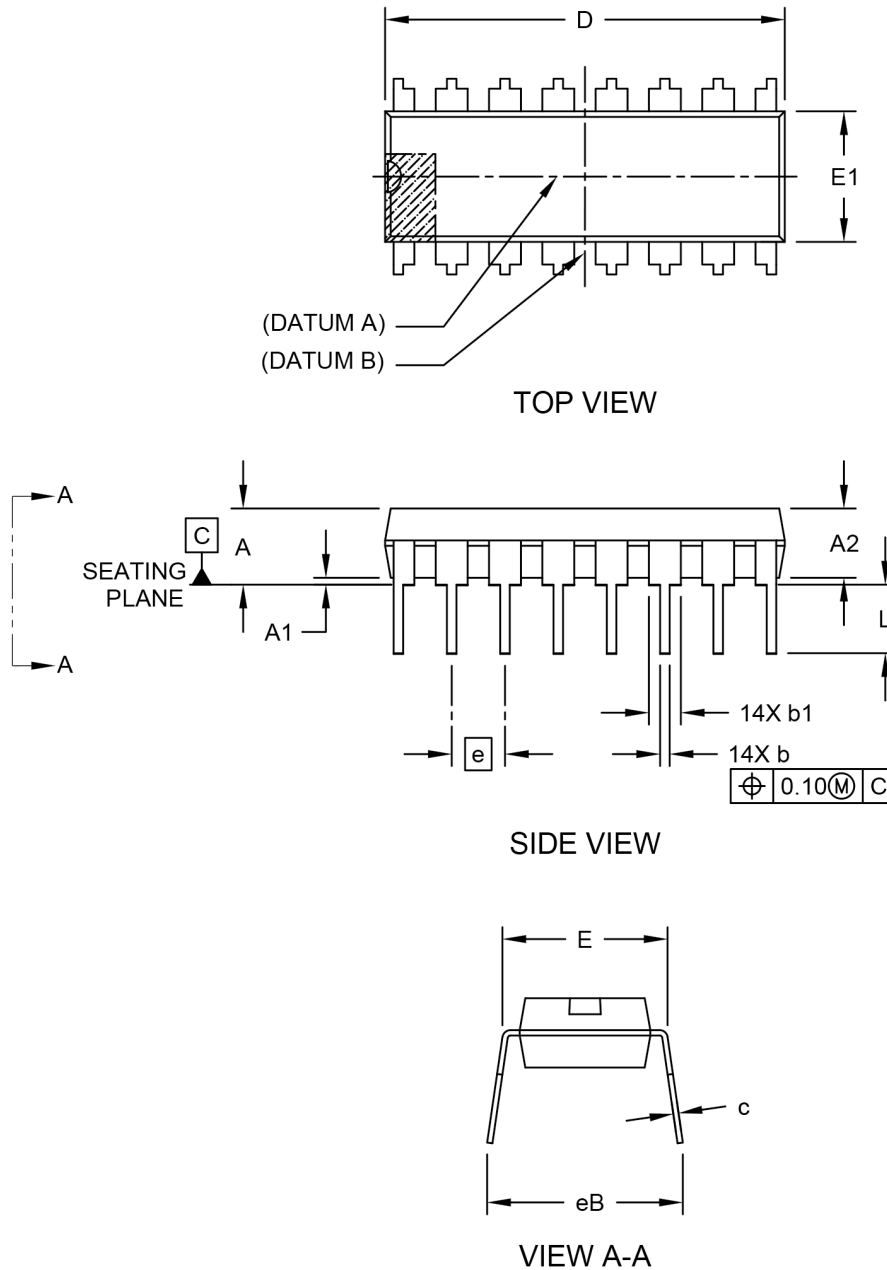
Notes:

1. Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. The theoretically exact value is shown without tolerances.
2. For best soldering results, thermal vias, if used, should be filled or tented to avoid solder loss during the reflow process.

Microchip Technology Drawing C04-02012 (J7X) Rev E

16-Lead Plastic Dual In-Line (D6X) - 300 mil Body [PDIP]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

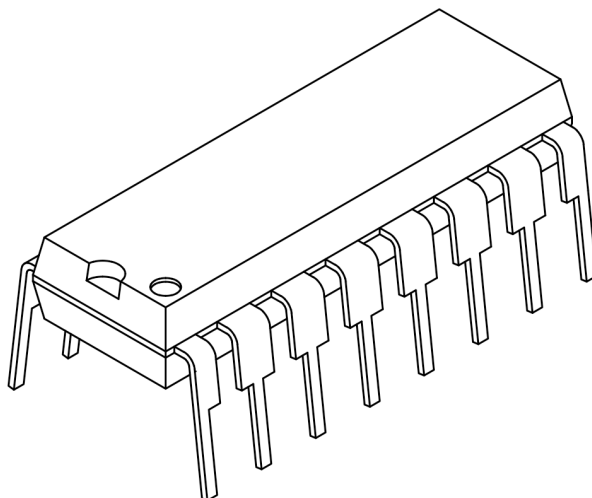


Microchip Technology Drawing C04-00017 Rev C (D6X) Sheet 1 of 2

LM2575

16-Lead Plastic Dual In-Line (D6X) - 300 mil Body [PDIP]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		16		
Pitch	e		.100 BSC		
Top to Seating Plane	A		-	-	.210
Molded Package Thickness	A2		.115	.130	.195
Base to Seating Plane	A1		.015	-	-
Shoulder to Shoulder Width	E		.290	.310	.325
Molded Package Width	E1		.240	.250	.280
Overall Length	D		.735	.750	.775
Tip to Seating Plane	L		.115	.130	.150
Lead Thickness	c		.008	.010	.015
Upper Lead Width	b1		.045	.060	.070
Lower Lead Width	b		.014	.018	.022
Overall Row Spacing	§	eB	-	-	.430

Notes:

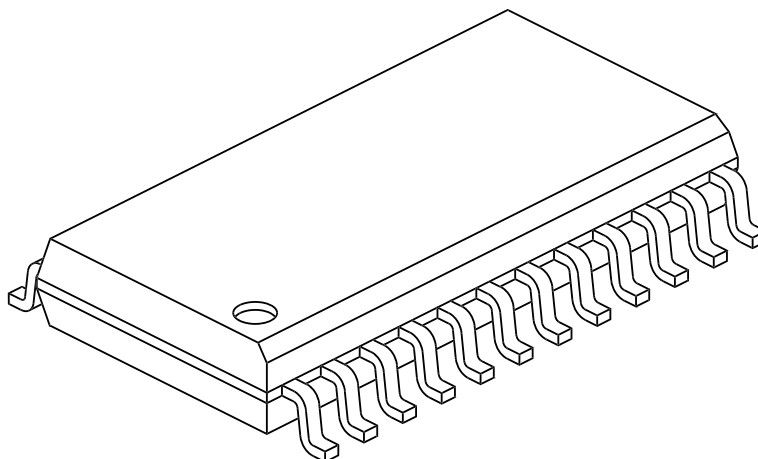
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensions D and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .005" per side.
4. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-00017 Rev C (D6X) Sheet 2 of 2

24-Lead Plastic Small Outline (K3X) - Wide, 7.50 mm Body [SOIC]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	24		
Pitch	e	1.27 BSC		
Overall Height	A	-	-	2.65
Molded Package Thickness	A2	2.05	-	-
Standoff §	A1	0.10	-	0.30
Overall Width	E	10.30 BSC		
Molded Package Width	E1	7.50 BSC		
Overall Length	D	15.40 BSC		
Chamfer (Optional)	h	0.25	-	0.75
Foot Length	L	0.40	-	1.27
Footprint	L1	1.40 REF		
Lead Angle	Θ	0°	-	-
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.20	-	0.33
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

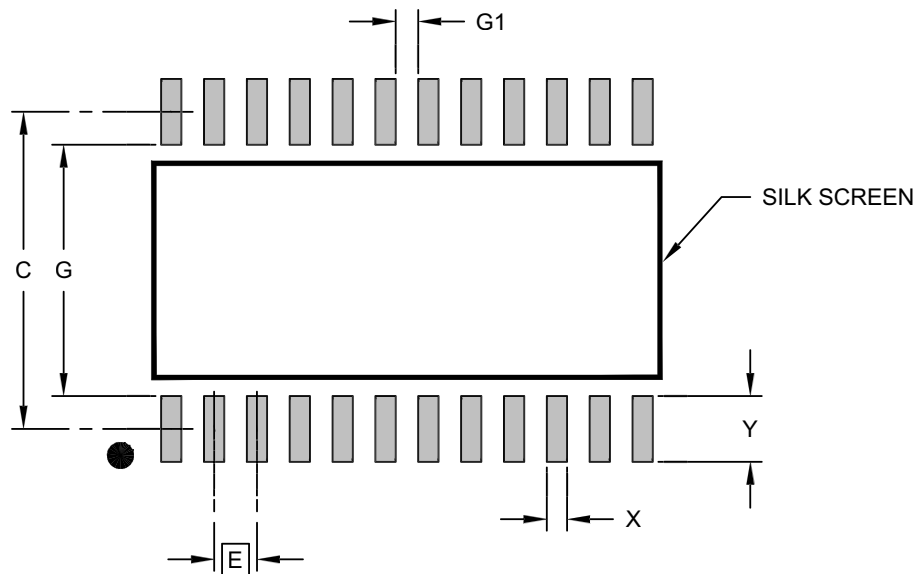
Notes:

- The Pin 1 visual index feature may vary, but it must be located within the hatched area.
- § Significant Characteristic
- Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M
 - BSC: Basic Dimension. The theoretically exact value is shown without tolerances.
 - REF: Reference Dimension, usually without tolerance, is for information purposes only.
- Datums A & B to be determined at Datum H.

Microchip Technology Drawing C04-00025 [K3X] Rev F Sheet 2 of 2

24-Lead Plastic Small Outline (K3X) - Wide, 7.50 mm Body [SOIC]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

**RECOMMENDED LAND PATTERN**

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	1.27 BSC		
Contact Pad Spacing	C		9.40	
Contact Pad Width	X			0.60
Contact Pad Length	Y			2.00
Distance Between Pads	G1	0.67		
Distance Between Pads	G	7.40		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. The theoretically exact value is shown without tolerances.

Microchip Technology Drawing C04-02025 [K3X] Rev F

LM2575

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (December 2025)

- Converted Micrel document LM2575 to Microchip data sheet DS20007078A.
- Minor text changes throughout.

LM2575

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

<u>Part Number</u>	<u>[-X.X]</u>	<u>X</u>	<u>XX</u>	<u>[-XX]</u>	Examples:
Device	Output Voltage	Temp. Range	Package	Media Type	
Device:	LM2575:	52 kHz Simple 1A Buck Regulator			a) LM2575-3.3WU: LM2575, 3.3V Output Voltage, -40°C to +85°C Temp. Range, 5-Lead TO-263, 50/Tube
Output Voltage:	3.3	=	3.3V		b) LM2575YN: LM2575, Adjustable Output Voltage, -40°C to +85°C Temp. Range, 16-Lead PDIP, 25/Tube
	5.0	=	5.0V		c) LM2575-12YWM-TR: LM2575, 12V Output Voltage, -40°C to +85°C Temp. Range, 24-Lead Wide SOIC, 1,000/Reel
	12	=	12V		d) LM2575-5.0WT: LM2575, 5.0V Output Voltage, -40°C to +85°C Temp. Range, 5-Lead TO-220, 50/Tube
	<blank>	=	Adjustable		e) LM2575YWM: LM2575, Adjustable Output Voltage, -40°C to +85°C Temp. Range, 24-Lead Wide SOIC, 31/Tube
Temperature Range:	W	=	-40°C to +85°C (TO-220 and TO-263 only)		f) LM2575-3.3YN: LM2575, 3.3V Output Voltage, -40°C to +85°C Temp. Range, 16-Lead PDIP, 25/Tube
	Y	=	-40°C to +85°C (PDIP and SOIC only)		g) LM2575WU-TR: LM2575, Adjustable Output Voltage, -40°C to +85°C Temp. Range, 5-Lead TO-263, 750/Reel
Package:	T	=	5-Lead TO-220		Note: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.
	U	=	5-Lead TO-263		
	N	=	16-Lead PDIP		
	WM	=	24-Lead Wide SOIC		
Media Type:	<blank>	=	25/Tube (PDIP only)		
	<blank>	=	31/Tube (SOIC only)		
	<blank>	=	50/Tube (TO-220/263 only)		
	TR	=	750/Reel (TO-263 only)		
	TR	=	1,000/Reel (SOIC only)		

LM2575

NOTES:

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