

LMS1585A 5A/LMS1587 5A and 3A Low Dropout Fast Response Regulators

Check for Samples: [LMS1585A](#) , [LMS1587](#)

FEATURES

- Fast Transient Response
- Available in Adjustable, 1.5V, and 3.3V versions
- Current Limiting and Thermal Protection
- Commercial Temp. Range: 0°C to 125°C
- Industrial Temp. Range: –40°C to 125°C
- Line Regulation 0.005% (typical)
- Load Regulation 0.05% (typical)
- Direct Replacement for LT[®] 1585A/87

APPLICATIONS

- Pentium[®] processor supplies
- PowerPC[®] supplies
- Other microprocessor supplies
- Low voltage logic supplies

DESCRIPTION

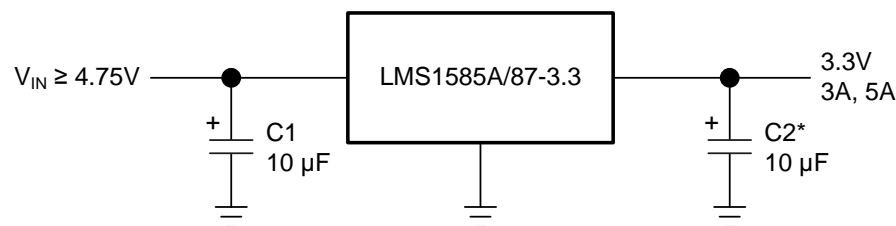
The LMS1585A and LMS1587 are low dropout positive regulators with output load current of 5A and 3A respectively. Their low dropout voltage (1.2V) and fast transient response make them an excellent solution for low voltage microprocessor applications.

The LMS1585A/87 are available in adjustable versions, which can set the output voltage with only two external resistors. In addition, they are also available in 1.5V and 3.3V fixed voltage versions⁽¹⁾.

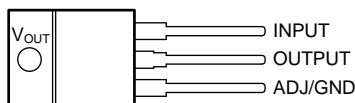
The LMS1585A/87 circuits include a zener trimmed bandgap reference, current limiting and thermal shutdown. The LMS1585A/87 series are available in KTT (TO-263) and NDE (TO-220) packages.

(1) Consult factory for other fixed voltage options.

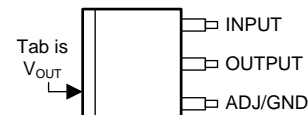
Typical Application



* Required for Stability



**Figure 1. NDE (TO-220)
(Top View)**



**Figure 2. KTT (TO-263)
(Top View)**



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PowerPC is a registered trademark of IBM.

Pentium is a registered trademark of Intel Corporation.

LT is a registered trademark of Linear Technology.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of the Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

Copyright © 2003–2013, Texas Instruments Incorporated

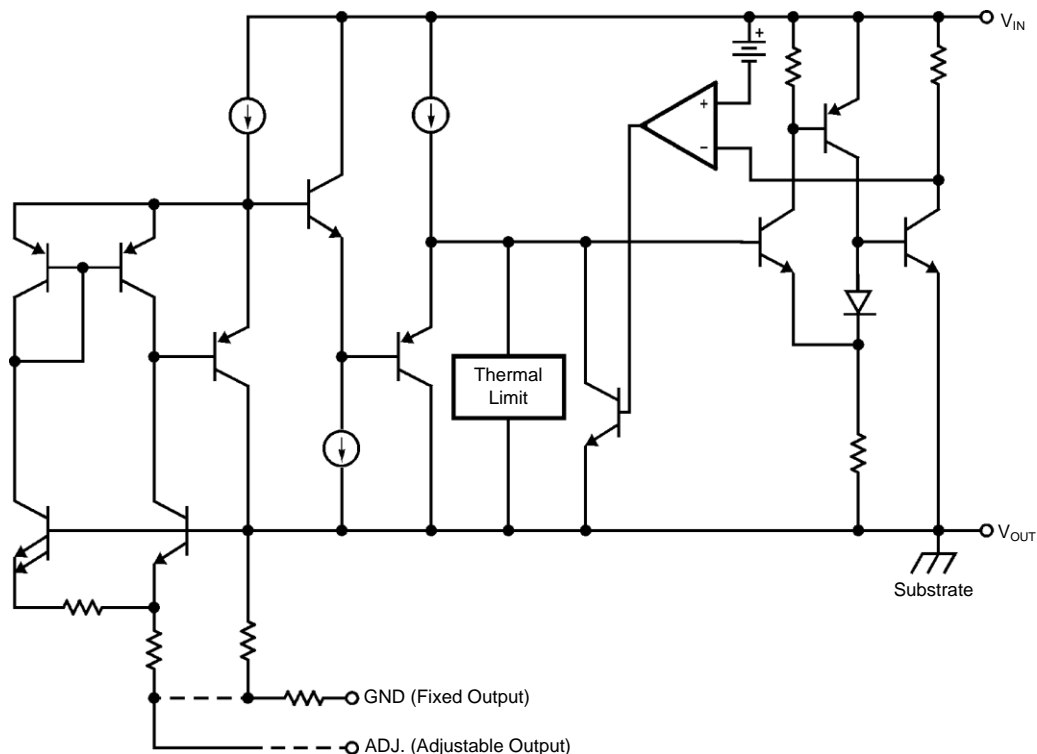


Table 1. LMS1585A/LMS1587 Device Options

Part Number	Output Voltage	Operating Temperature	Package Drawing	Package Type	Output Current	
LMS1585AIS-1.5	1.5V	-40°C to 125°C	KTT	TO-263	5A	
LMS1585AIS-3.3	3.3V					
LMS1585ACS-ADJ	Adjustable	0°C to 125°C				
LMS1585ACS-1.5	1.5V					
LMS1585ACS-3.3	3.3V					
LMS1585ACT-1.5	1.5V		NDE	TO-220	5A	
LMS1585ACT-3.3	3.3V					
LMS1587IS-ADJ	Adjustable	−40°C to 125°C	KTT	TO-263	3A	
LMS1587IS-1.5	1.5V					
LMS1587IS-3.3	3.3V					
LMS1587CS-ADJ	Adjustable	0°C to 125°C				
LMS1587CS-3.3	3.3V					
LMS1587CS-1.5	1.5V					
LMS1587IT-1.5	1.5V	−40°C to 125C	NDE	TO-220		
LMS1587CT-ADJ	Adjustable	0°C to 125°C				
LMS1587CT-3.3	3.3V					



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾⁽²⁾

Maximum Input to Output Voltage (V_{IN} to GND)	13V
Power Dissipation ⁽³⁾	Internally Limited
Junction Temperature (T_J) ⁽³⁾	150°C
Storage Temperature Range	-65°C to 150°C
Lead Temperature	260°C, 10 sec
ESD Tolerance ⁽⁴⁾	2000V

- (1) Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured. For ensured specifications and the test conditions, see the Electrical Characteristics.
- (2) If Military/Aerospace specified devices are required, please contact the TI Sales Office/ Distributors for availability and specifications.
- (3) The maximum power dissipation is a function of $T_{J(max)}$, θ_{JA} , and T_A . The maximum allowable power dissipation at any ambient temperature is $P_D = (T_{J(max)} - T_A) / \theta_{JA}$. All numbers apply for packages soldered directly into a PC board.
- (4) For testing purposes, ESD was applied using human body model, 1.5 k Ω in series with 100 pF.

ELECTRICAL CHARACTERISTICS

Typicals and limits appearing in normal type apply for $T_J = 25^\circ\text{C}$. Limits appearing in **Boldface** type apply over the entire junction temperature range for operation, 0°C to 125°C for commercial grade and -40°C to 125°C for industrial grade.

Symbol	Parameter	Conditions	Min ⁽¹⁾	Typ ⁽²⁾	Max ⁽¹⁾	Units
V_{REF}	Reference Voltage	LMS1585A-ADJ $V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$, $I_{\text{OUT}} = 10\text{mA}$ $10\text{mA} \leq I_{\text{OUT}} \leq 5\text{A}$, $1.5\text{V} \leq V_{\text{IN}} - V_{\text{OUT}} \leq 5.75\text{V}$	1.238 1.225	1.250 1.250	1.262 1.275	V V
		LMS1587-ADJ $10\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$, $1.5\text{V} \leq V_{\text{IN}} - V_{\text{OUT}} \leq 5.75\text{V}$	1.225	1.250	1.275	V
V_{OUT}	Output Voltage	LMS1585A-1.5 $I_{\text{OUT}} = 0\text{mA}$, $V_{\text{IN}} = 5\text{V}$ $0 \leq I_{\text{OUT}} \leq 5\text{A}$, $3\text{V} \leq V_{\text{IN}} \leq 7\text{V}$	1.485 1.470	1.500	1.515 1.530	V V
		LMS1585A-3.3 $I_{\text{OUT}} = 0\text{mA}$, $V_{\text{IN}} = 5\text{V}$ $0 \leq I_{\text{OUT}} \leq 5\text{A}$, $4.75\text{V} \leq V_{\text{IN}} \leq 7\text{V}$	3.267 3.235	3.300 3.300	3.333 3.365	V V
		LMS1587-1.5 $V_{\text{IN}} = 5\text{V}$, $I_{\text{OUT}} = 0\text{mA}$, $T_J = 25^\circ\text{C}$ $0 \leq I_{\text{OUT}} \leq 3\text{A}$, $3\text{V} \leq V_{\text{IN}} \leq 7\text{V}$	1.485 1.470	1.500 1.500	1.515 1.530	V V
		LMS1587-3.3 $0 \leq I_{\text{OUT}} \leq 3\text{A}$, $4.75\text{V} \leq V_{\text{IN}} \leq 7\text{V}$	3.235	3.300	3.365	V
ΔV_{OUT}	Line Regulation ⁽³⁾	LMS1585A/87-ADJ $I_{\text{OUT}} = 10\text{mA}$, $2.75\text{V} \leq V_{\text{IN}} \leq 7\text{V}$		0.005	0.2	%
		LMS1585A/87-3.3 $I_{\text{OUT}} = 0\text{mA}$, $4.75\text{V} \leq V_{\text{IN}} \leq 7\text{V}$		0.005	0.2	%
		LMS1585A/87-1.5 $I_{\text{OUT}} = 0\text{mA}$, $3\text{V} \leq V_{\text{IN}} \leq 7\text{V}$		0.005	0.2	%
ΔV_{OUT}	Load Regulation ⁽³⁾	LMS1585A-ADJ $V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$, $10\text{mA} \leq I_{\text{OUT}} \leq 5\text{A}$		0.05	0.3 0.5	%
		LMS1585A-1.5/LMS1585A-3.3 $V_{\text{IN}} = 5\text{V}$, $0 \leq I_{\text{OUT}} \leq 5\text{A}$		0.05 0.05	0.3 0.5	% %
		LMS1587-ADJ $V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$, $10\text{mA} \leq I_{\text{OUT}} \leq 3\text{A}$		0.05 0.05	0.3 0.5	% %
		LMS1587-1.5/LMS1587-3.3 $V_{\text{IN}} = 5\text{V}$, $0 \leq I_{\text{OUT}} \leq 3\text{A}$		0.05 0.05	0.3 0.5	% %
$V_{\text{IN}} - V_{\text{OUT}}$	Dropout Voltage	LMS1585A-ADJ/LMS1587-ADJ $\Delta V_{\text{REF}} = 1\%$, $I_{\text{OUT}} = 3\text{A}$		1.15	1.3	V
		LMS1585A-3.3/LMS1587-3.3/ LMS1585A-1.5/LMS1587-1.5 $\Delta V_{\text{OUT}} = 1\%$, $I_{\text{OUT}} = 3\text{A}$		1.15	1.3	V
		LMS1585A-ADJ $\Delta V_{\text{REF}} = 1\%$, $I_{\text{OUT}} = 5\text{A}$		1.2	1.4	V
		LMS1585A-1.5/LMS1585A-3.3 $\Delta V_{\text{OUT}} = 1\%$, $I_{\text{OUT}} = 5\text{A}$		1.2	1.4	V

(1) All limits are specified by testing or statistical analysis.

(2) Typical Values represent the most likely parametric norm.

(3) Load and line regulation are measured at constant junction temperature, and are ensured up to the maximum power dissipation of 30W. Power dissipation is determined by the input/output differential and the output current. Ensured maximum power dissipation will not be available over the full input/output range.

ELECTRICAL CHARACTERISTICS (continued)

Typicals and limits appearing in normal type apply for $T_J = 25^\circ\text{C}$. Limits appearing in **Boldface** type apply over the entire junction temperature range for operation, 0°C to 125°C for commercial grade and -40°C to 125°C for industrial grade.

I_{LIMIT}	Current Limit	LMS1585A-ADJ/LMS1585A-3.3/LMS1585A-1.5 $V_{\text{IN}} - V_{\text{OUT}} = 5.5\text{V}$	5.0	6.6		A
		LMS1587-ADJ/LMS1587-3.3/LMS1587-1.5 $V_{\text{IN}} - V_{\text{OUT}} = 5.5\text{V}$	3.1	4.3		A
	Minimum Load Current ⁽⁴⁾	LMS1585A/87-ADJ $1.5\text{V} \leq V_{\text{IN}} - V_{\text{OUT}} \leq 5.75\text{V}$		2.0	10.0	mA
	Quiescent Current	LMS1585A-3.3/LMS1587-3.3/ LMS1585A-1.5/LMS1587-1.5 $V_{\text{IN}} = 5\text{V}$		7.0	13.0	mA
	Thermal Regulation	$T_A = 25^\circ\text{C}$, 30ms Pulse		0.003		%/W
	Ripple Rejection	LMS1585A-ADJ $f_{\text{RIPPLE}} = 120\text{Hz}$, $V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$, $I_{\text{OUT}} = 5\text{A}$, $C_{\text{OUT}} = 25\mu\text{F}$ Tantalum		72		dB
		LMS1585A-1.5 $f_{\text{RIPPLE}} = 120\text{Hz}$, $C_{\text{OUT}} = 25\mu\text{F}$ Tantalum, $I_{\text{OUT}} = 5\text{A}$, $V_{\text{IN}} = 4.5\text{V}$	60	72		dB
		LMS1585A-3.3 $f_{\text{RIPPLE}} = 120\text{Hz}$, $C_{\text{OUT}} = 25\mu\text{F}$ Tantalum, $I_{\text{OUT}} = 5\text{A}$, $V_{\text{IN}} = 6.3\text{V}$		72		dB
		LMS1587-ADJ $f_{\text{RIPPLE}} = 120\text{Hz}$, $V_{\text{IN}} - V_{\text{OUT}} = 3\text{V}$, $I_{\text{OUT}} = 3\text{A}$ $C_{\text{OUT}} = 25\mu\text{F}$ Tantalum		72		dB
		LMS1587-1.5 $f_{\text{RIPPLE}} = 120\text{Hz}$, $C_{\text{OUT}} = 25\mu\text{F}$ Tantalum, $I_{\text{OUT}} = 3\text{A}$, $V_{\text{IN}} = 4.5\text{V}$	60	72		dB
		LMS1587-3.3 $f_{\text{RIPPLE}} = 120\text{Hz}$, $C_{\text{OUT}} = 25\mu\text{F}$ Tantalum, $I_{\text{OUT}} = 3\text{A}$, $V_{\text{IN}} = 6.3\text{V}$		72		dB
	Adjust Pin Current			55	120	μA
	Adjust Pin Current	$10\text{mA} \leq I_{\text{OUT}} \leq I_{\text{FULLLOAD}}$, $1.5\text{V} \leq V_{\text{IN}} - V_{\text{OUT}} \leq 5.75\text{V}$ ⁽⁵⁾		0.2		μA
	Temperature Stability			0.5		%
	Long Term Stability	$T_A = 125^\circ\text{C}$, 1000Hrs		0.03		%
	RMS Output Noise (% of V_{OUT})	$10\text{Hz} \leq f \leq 10\text{kHz}$		0.003		%
	Thermal Resistance Junction-to-Case	3-Lead KTT (TO-263): Control/Output Section 3-Lead NDE (TO-220): Control/Output Section			0.65/2.7 0.65/2.7	*C/W *C/W

(4) The minimum output current required to maintain regulation.

(5) I_{FULLLOAD} is 5A for LMS1585A and 3A for LMS1587.

APPLICATION NOTE

OUTPUT VOLTAGE

The adjustable version develops at 1.25V reference voltage, (V_{REF}), between the output and the adjust terminal. As shown in [Figure 3](#), this voltage is applied across resistor $R1$ to generate a constant current $I1$. This constant current then flows through $R2$. The resulting voltage drop across $R2$ adds to the reference voltage to sets the desired output voltage.

The current I_{ADJ} from the adjustment terminal introduces an output error. But since it is small (120 μ A max), it becomes negligible when $R1$ is in the 100 Ω range.

For fixed voltage devices, $R1$ and $R2$ are integrated inside the devices.

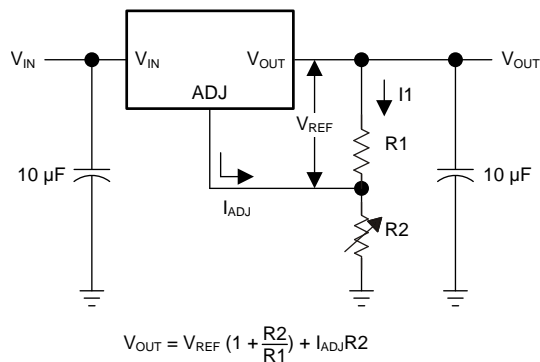


Figure 3. Basic Adjustable Regulator

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LMS1585ACS-1.5	NRND	DDPAK/ TO-263	KTT	3	45	TBD	Call TI	Call TI	0 to 125	LMS1585 ACS-1.5	
LMS1585ACS-1.5/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	45	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	0 to 125	LMS1585 ACS-1.5	Samples
LMS1585ACS-3.3	NRND	DDPAK/ TO-263	KTT	3	45	TBD	Call TI	Call TI	0 to 125	LMS1585 ACS-3.3	
LMS1585ACS-3.3/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	45	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	0 to 125	LMS1585 ACS-3.3	Samples
LMS1585ACSX-1.5/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	500	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	0 to 125	LMS1585 ACS-1.5	Samples
LMS1585ACSX-3.3	NRND	DDPAK/ TO-263	KTT	3	500	TBD	Call TI	Call TI	0 to 125	LMS1585 ACS-3.3	
LMS1585ACSX-3.3/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	500	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	0 to 125	LMS1585 ACS-3.3	Samples
LMS1585ACSX-ADJ	NRND	DDPAK/ TO-263	KTT	3	500	TBD	Call TI	Call TI	0 to 125	LMS1585 ACS-ADJ	
LMS1585ACSX-ADJ/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	500	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	0 to 125	LMS1585 ACS-ADJ	Samples
LMS1585ACT-1.5	NRND	TO-220	NDE	3	45	TBD	Call TI	Call TI	0 to 125	LMS1585ACT 1.5	
LMS1585ACT-1.5/NOPB	ACTIVE	TO-220	NDE	3	45	Green (RoHS & no Sb/Br)	CU SN	Level-1-NA-UNLIM	0 to 125	LMS1585ACT 1.5	Samples
LMS1585ACT-3.3	NRND	TO-220	NDE	3	45	TBD	Call TI	Call TI	0 to 125	LMS1585 ACT-3.3	
LMS1585ACT-3.3/NOPB	ACTIVE	TO-220	NDE	3	45	Green (RoHS & no Sb/Br)	CU SN	Level-1-NA-UNLIM	0 to 125	LMS1585 ACT-3.3	Samples
LMS1585AIS-1.5	NRND	DDPAK/ TO-263	KTT	3	45	TBD	Call TI	Call TI	-40 to 125	LMS1585 AIS-1.5	
LMS1585AIS-1.5/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	45	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	-40 to 125	LMS1585 AIS-1.5	Samples
LMS1585AIS-3.3/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	45	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	-40 to 125	LMS1585 AIS-3.3	Samples
LMS1587CS-1.5	NRND	DDPAK/ TO-263	KTT	3	45	TBD	Call TI	Call TI	0 to 125	LMS1587 CS-1.5	

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LMS1587CS-1.5/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	45	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	0 to 125	LMS1587 CS-1.5	Samples
LMS1587CS-3.3	NRND	DDPAK/ TO-263	KTT	3	45	TBD	Call TI	Call TI	0 to 125	LMS1587 CS-3.3	
LMS1587CS-3.3/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	45	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	0 to 125	LMS1587 CS-3.3	Samples
LMS1587CS-ADJ	NRND	DDPAK/ TO-263	KTT	3	45	TBD	Call TI	Call TI	0 to 125	LMS1587 CS-ADJ	
LMS1587CS-ADJ/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	45	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	0 to 125	LMS1587 CS-ADJ	Samples
LMS1587CSX-1.5	NRND	DDPAK/ TO-263	KTT	3	500	TBD	Call TI	Call TI	0 to 125	LMS1587 CS-1.5	
LMS1587CSX-1.5/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	500	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	0 to 125	LMS1587 CS-1.5	Samples
LMS1587CSX-3.3	NRND	DDPAK/ TO-263	KTT	3	500	TBD	Call TI	Call TI	0 to 125	LMS1587 CS-3.3	
LMS1587CSX-3.3/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	500	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	0 to 125	LMS1587 CS-3.3	Samples
LMS1587CSX-ADJ	NRND	DDPAK/ TO-263	KTT	3	500	TBD	Call TI	Call TI	0 to 125	LMS1587 CS-ADJ	
LMS1587CSX-ADJ/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	500	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	0 to 125	LMS1587 CS-ADJ	Samples
LMS1587CT-3.3	NRND	TO-220	NDE	3	45	TBD	Call TI	Call TI	0 to 125	LMS1587 CT-3.3	
LMS1587CT-3.3/NOPB	ACTIVE	TO-220	NDE	3	45	Green (RoHS & no Sb/Br)	CU SN	Level-1-NA-UNLIM	0 to 125	LMS1587 CT-3.3	Samples
LMS1587CT-ADJ	NRND	TO-220	NDE	3	45	TBD	Call TI	Call TI	0 to 125	LMS1587 CT-ADJ	
LMS1587CT-ADJ/NOPB	ACTIVE	TO-220	NDE	3	45	Green (RoHS & no Sb/Br)	CU SN	Level-1-NA-UNLIM	0 to 125	LMS1587 CT-ADJ	Samples
LMS1587IS-1.5	NRND	DDPAK/ TO-263	KTT	3	45	TBD	Call TI	Call TI	-40 to 125	LMS1587 IS-1.5	
LMS1587IS-1.5/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	45	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	-40 to 125	LMS1587 IS-1.5	Samples
LMS1587IS-3.3	NRND	DDPAK/ TO-263	KTT	3	45	TBD	Call TI	Call TI	-40 to 125	LMS1587 IS-3.3	

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LMS1587IS-3.3/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	45	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	-40 to 125	LMS1587 IS-3.3	Samples
LMS1587IS-ADJ	NRND	DDPAK/ TO-263	KTT	3	45	TBD	Call TI	Call TI	-40 to 125	LMS1587 IS-ADJ	
LMS1587IS-ADJ/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	45	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	-40 to 125	LMS1587 IS-ADJ	Samples
LMS1587ISX-3.3/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	500	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	-40 to 125	LMS1587 IS-3.3	Samples
LMS1587ISX-ADJ	NRND	DDPAK/ TO-263	KTT	3	500	TBD	Call TI	Call TI	-40 to 125	LMS1587 IS-ADJ	
LMS1587ISX-ADJ/NOPB	ACTIVE	DDPAK/ TO-263	KTT	3	500	Pb-Free (RoHS Exempt)	CU SN	Level-3-245C-168 HR	-40 to 125	LMS1587 IS-ADJ	Samples
LMS1587IT-1.5	NRND	TO-220	NDE	3	45	TBD	Call TI	Call TI	-40 to 125	LMS1587 IT-1.5	
LMS1587IT-1.5/NOPB	ACTIVE	TO-220	NDE	3	45	Green (RoHS & no Sb/Br)	CU SN	Level-1-NA-UNLIM	-40 to 125	LMS1587 IT-1.5	Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

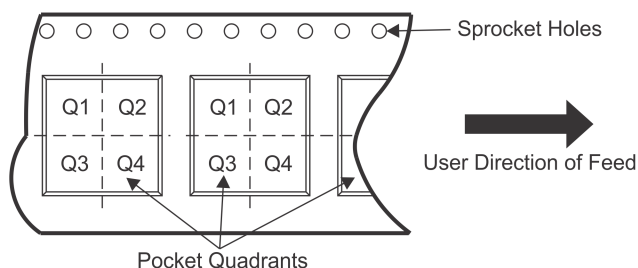
⁽⁵⁾ Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

⁽⁶⁾ Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION

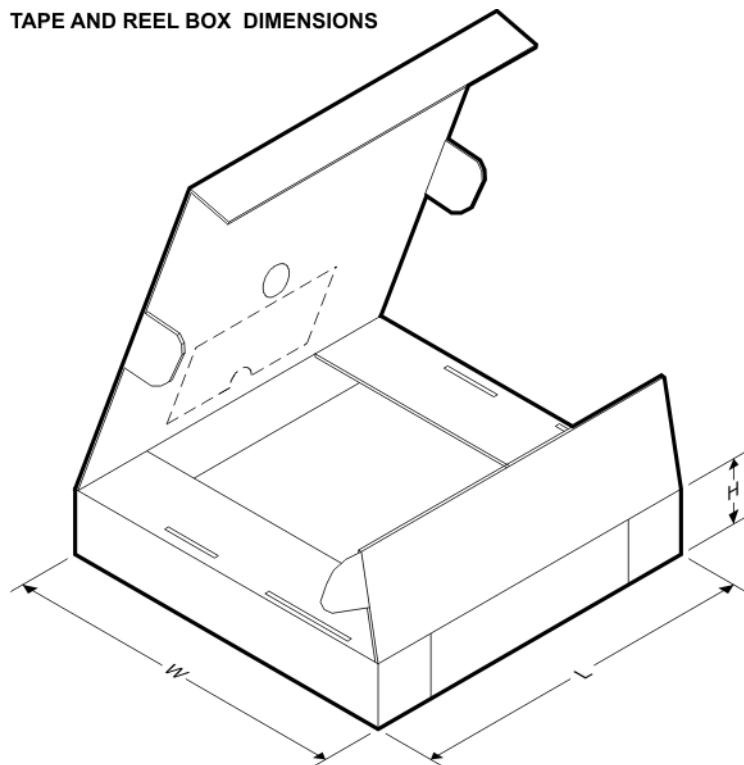
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LMS1585ACSX-1.5/NOPB	DDPAK/TO-263	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2
LMS1585ACSX-3.3	DDPAK/TO-263	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2
LMS1585ACSX-3.3/NOPB	DDPAK/TO-263	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2
LMS1585ACSX-ADJ	DDPAK/TO-263	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2
LMS1585ACSX-ADJ/NOPB	DDPAK/TO-263	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2
LMS1587CSX-1.5	DDPAK/TO-263	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2
LMS1587CSX-1.5/NOPB	DDPAK/TO-263	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2
LMS1587CSX-3.3	DDPAK/TO-263	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2
LMS1587CSX-3.3/NOPB	DDPAK/TO-263	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2
LMS1587CSX-ADJ	DDPAK/TO-263	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2
LMS1587CSX-ADJ/NOPB	DDPAK/	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
	TO-263											
LMS1587ISX-3.3/NOPB	DDPAK/TO-263	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2
LMS1587ISX-ADJ	DDPAK/TO-263	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2
LMS1587ISX-ADJ/NOPB	DDPAK/TO-263	KTT	3	500	330.0	24.4	10.75	14.85	5.0	16.0	24.0	Q2

TAPE AND REEL BOX DIMENSIONS

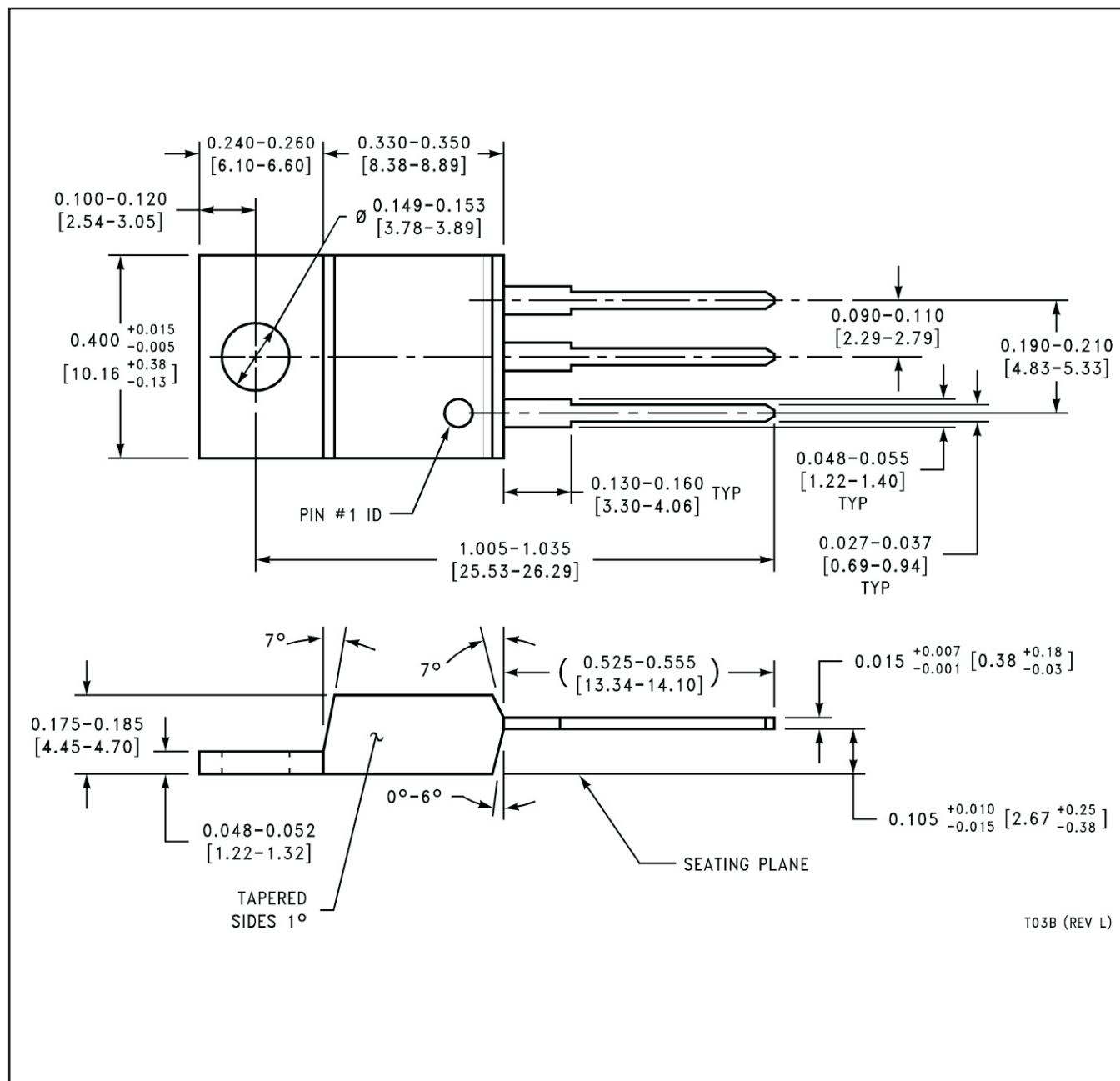


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LMS1585ACXSX-1.5/NOPB	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0
LMS1585ACXSX-3.3	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0
LMS1585ACXSX-3.3/NOPB	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0
LMS1585ACXSX-ADJ	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0
LMS1585ACXSX-ADJ/NOPB	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0
LMS1587CSX-1.5	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0
LMS1587CSX-1.5/NOPB	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0
LMS1587CSX-3.3	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0
LMS1587CSX-3.3/NOPB	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0
LMS1587CSX-ADJ	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LMS1587CSX-ADJ/NOPB	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0
LMS1587ISX-3.3/NOPB	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0
LMS1587ISX-ADJ	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0
LMS1587ISX-ADJ/NOPB	DDPAK/TO-263	KTT	3	500	367.0	367.0	45.0

NDE0003B





IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Applications Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community

e2e.ti.com