

Description

GM6250L series is a group of positive voltage output regulators that provide a high current even when the input/output voltage difference is small. Low power consumption and high accuracy is achieved through CMOS and programmable fuse technologies. The output voltage is 1.0V to 6.0V in 0.1V increments. The quiescent current (typical) is only 1 μ A.

The GM6250L can operate with low cost ceramic capacitors, 1 μ F MLCC capacitors.

The GM6250L consists of a high precision voltage reference, an error correction circuit, and a current-limited output driver. The transient response to load variations has improved in comparison to the existing series of positive voltage regulators.

GM6250L comes in SOT-23 (150mW), and SOT-89 (500mW) packages.

Features

- ◆ Operating at low output current from 1 μ A
- ◆ Stable with 1 μ F MLCC capacitor
- ◆ Maximum output current up to 300mA
- ◆ Output voltage from 1.0V to 6.0V in 0.1V increments
- ◆ Output voltage accuracy : $\pm 2\%$
- ◆ CMOS low power consumption, typically 1.0 μ A at $V_{OUT} = 5.0V$
- ◆ Input stability: typically 0.2%/V
- ◆ Ultra low dropout voltage: 0.4V @ $I_{OUT} = 160mA$ at $V_{OUT} > 2.5V$

Application

Palmtops

Portable Cameras

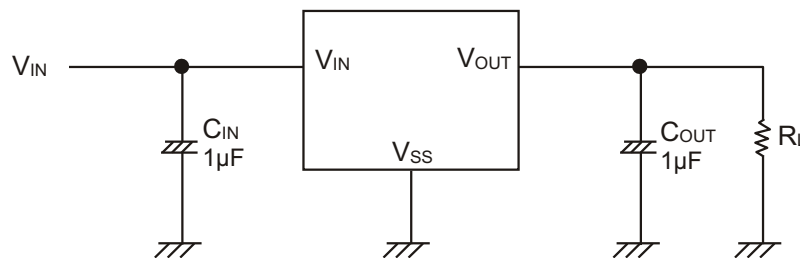
Video Recorders

Battery Powered Equipment

Reference Voltage Sources

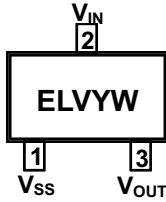
Typical Application Circuits

GM6250L-x.x

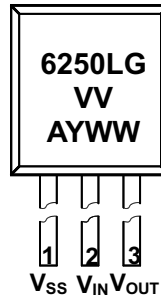


Marking Information and Pin Configurations (Top View)

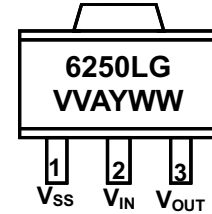
SOT23



TO92



SOT89



EL: Device Code, Green Product

V: Voltage Code (see next page)

Y: Year (0 = 2020, 1 = 2021)

W: Week Code

Week 1-26 : A – Z

Week 27-52 : A - Z

Week 53 : A

G: Green Product

VV: Voltage suffix (18 = 1.8V, 50 = 5.0V...)

A: Assembly Site Code

Y: Year (0 = 2020, 1 = 2021)

WW: Week Code

Ordering Information

Ordering Number	Output Voltage	Voltage Code	Package	Shipping
GM6250L-1.5T92BG	1.5V*		TO-92	1,000 Units/Bag
GM6250L-1.5ST23RG		C	SOT-23	3,000 Units/Tape and Reel
GM6250L-1.5ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-1.8T92BG	1.8V		TO-92	1,000 Units/Bag
GM6250L-1.8ST23RG		E	SOT-23	3,000 Units/Tape and Reel
GM6250L-1.8ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-2.2T92BG	2.2V*		TO-92	1,000 Units/Bag
GM6250L-2.2ST23RG		D	SOT-23	3,000 Units/Tape and Reel
GM6250L-2.2ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-2.5T92BG	2.5V		TO-92	1,000 Units/Bag
GM6250L-2.5ST23RG		G	SOT-23	3,000 Units/Tape and Reel
GM6250L-2.5ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-2.7T92BG	2.7V*		TO-92	1,000 Units/Bag
GM6250L-2.7ST23RG		T	SOT-23	3,000 Units/Tape and Reel
GM6250L-2.7ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-2.8T92BG	2.8V*		TO-92	1,000 Units/Bag
GM6250L-2.8ST23RG		H	SOT-23	3,000 Units/Tape and Reel
GM6250L-2.8ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-2.85T92BG	2.85V*		TO-92	1,000 Units/Bag
GM6250L-2.85ST23RG		I	SOT-23	3,000 Units/Tape and Reel
GM6250L-2.85ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-3.0T92BG	3.0V		TO-92	1,000 Units/Bag
GM6250L-3.0ST23RG		J	SOT-23	3,000 Units/Tape and Reel
GM6250L-3.0ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-3.2T92BG	3.2V*		TO-92	1,000 Units/Bag
GM6250L-3.2ST23RG		U	SOT-23	3,000 Units/Tape and Reel
GM6250L-3.2ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-3.3T92BG	3.3V		TO-92	1,000 Units/Bag
GM6250L-3.3ST23RG		K	SOT-23	3,000 Units/Tape and Reel
GM6250L-3.3ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-3.5T92BG	3.5V*		TO-92	1,000 Units/Bag
GM6250L-3.5ST23RG		V	SOT-23	3,000 Units/Tape and Reel
GM6250L-3.5ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-3.6T92BG	3.6V*		TO-92	1,000 Units/Bag
GM6250L-3.6ST23RG		L	SOT-23	3,000 Units/Tape and Reel
GM6250L-3.6ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-4.0T92BG	4.0V		TO-92	1,000 Units/Bag
GM6250L-4.0ST23RG		M	SOT-23	3,000 Units/Tape and Reel
GM6250L-4.0ST89RG			SOT-89	1,000 Units/Tape and Reel

Ordering Information (continued)

Ordering Number	Output Voltage	Voltage Code	Package	Shipping
GM6250L-4.4T92BG	4.4V*		TO-92	1,000 Units/Bag
GM6250L-4.4ST23RG		W	SOT-23	3,000 Units/Tape and Reel
GM6250L-4.4ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-4.5T92BG	4.5V*		TO-92	1,000 Units/Bag
GM6250L-4.5ST23RG		N	SOT-23	3,000 Units/Tape and Reel
GM6250L-4.5ST89RG			SOT-89	1,000 Units/Tape and Reel
GM6250L-5.0T92BG	5.0V		TO-92	1,000 Units/Bag
GM6250L-5.0ST23RG		Q	SOT-23	3,000 Units/Tape and Reel
GM6250L-5.0ST89RG			SOT-89	1,000 Units/Tape and Reel

* Optional output voltage upon request.

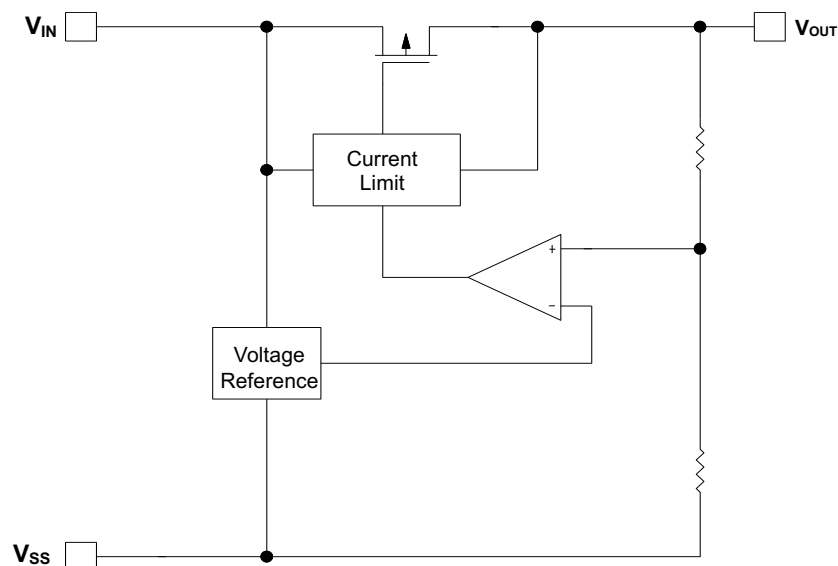
Absolute Maximum Ratings

PARAMETER	SYMBOL	RATINGS	UNITS
Input Voltage	V_{IN}	12	V
Output Current	I_{OUT}	500	mA
Output Voltage	V_{OUT}	$V_{SS} - 0.3$ to $V_{IN} + 0.3$	V
Operating Ambient Temperature	T_A	- 40 to 125	°C
Storage Temperature	T_{stg}	- 65 to 150	°C
Lead Temperature (Soldering, 10 sec)		+ 260	°C

Operating Ratings

PARAMETER	SYMBOL	RATINGS	UNITS
Input Voltage	V_{IN}	2.5 - 10	V
Continuous Total Power Dissipation	SOT-23	150	mW
	SOT-89	500	
	TO-92	300	

Block Diagram



Electrical Characteristics (T_A = 25°C, V_{IN} = V_{OUT} + 1V unless otherwise noted)

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Output Voltage	GM6250L-1.5	V _{OUT}	I _{OUT} = 40mA, V _{IN} = V _{OUT} + 1V	1.470	1.500	1.530	V
	GM6250L-1.8			1.764	1.800	1.836	
	GM6250L-2.2			2.156	2.200	2.244	
	GM6250L-2.5			2.450	2.500	2.550	
	GM6250L-2.7			2.646	2.700	2.754	
	GM6250L-2.8			2.744	2.800	2.856	
	GM6250L-3.0			2.940	3.000	3.060	
	GM6250L-3.2			3.136	3.200	3.264	
	GM6250L-3.3			3.234	3.300	3.366	
	GM6250L-3.5			3.430	3.500	3.570	
	GM6250L-3.6			3.528	3.600	3.672	
	GM6250L-4.0			3.920	4.000	4.080	
	GM6250L-4.4			4.312	4.400	4.488	
	GM6250L-4.5			4.410	4.500	4.590	
	GM6250L-5.0			4.900	5.000	5.100	
Output accuracy	GM6250L-x.x		I _{OUT} = 1uA, V _{IN} = 9V	-5%		5%	%
Line Regulation		ΔV _{OL}	I _{OUT} = 40mA, V _{OUT} + 1V < V _{IN} < 10V		0.2	0.3	%/V
Load Regulation		ΔV _{OL}	1mA < I _{OUT} < 80mA		0.02	0.03	%/mA
Dropout Voltage	V _{OUT} > 2.5V	ΔV	I _{OUT} = 160mA		0.4	0.7	V
	2.0V < V _{OUT} < 2.5V				0.55	0.85	
	V _{OUT} < 2.0V				0.9	1.3	
Current Consumption		I _Q			1.0	2.9	μA
Output Current Limit		I _{CL}		500			mA
Power Supply Rejection Ration		PSRR	10kHz		10		dB

Application Note

Notes on Usage

1. It is recommended to operate the GM6250L series within the stipulated absolute maximum ratings as the IC is liable to malfunction if it is operated outside the ratings.
2. There is a possibility of heat or oscillation as a result of the impedance present between the power supply and the IC's input. Where impedance is greater than 10Ω , it is recommended to use a capacitor (C_{IN}) of at least $1\mu F$ at the input terminal.
3. With a large output current, operations can be stabilized by increasing capacitor size (C_{IN}). If C_{IN} is too small and capacitance of (C_L) is increased, there is a possibility of oscillation due to input impedance. In such case, operation can be stabilized by either increasing the size of C_{IN} or decreasing the size of C_L .
4. Please ensure the output current (I_{OUT}) is less than $P_d \div (V_{IN} - V_{OUT})$ and does not exceed the stipulated continuous for total power dissipation value (P_d) for the package.

CALCULATING POWER DISSIPATION

The GM6250L series precision linear regulators include thermal shutdown and current limit circuitry to protect the devices. However, high power regulators normally operate at high junction temperatures so it is important to calculate the power dissipation and junction temperatures accurately to be sure that you use an adequate heat sink.

The thermal characteristics of an IC depend on four factors:

1. Maximum Ambient Temperature T_A ($^{\circ}C$)
2. Power Dissipation P_D (Watts)
3. Maximum Junction Temperature T_J ($^{\circ}C$)
4. Thermal Resistance Junction to ambient R_{JA} ($^{\circ}C/W$)

These relationships of these four factors is expressed by equation : $T_J = T_A + P_D \times R_{JA}$

Maximum ambient temperature and power dissipation are determined by the design while the maximum junction temperature and thermal resistance depend on the manufacturer and the package type.

Typical Performance Characteristics (for GM6250L-3.0)

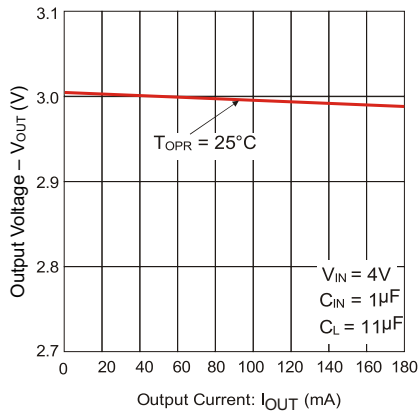


Figure 1: Output Voltage vs. Output Current

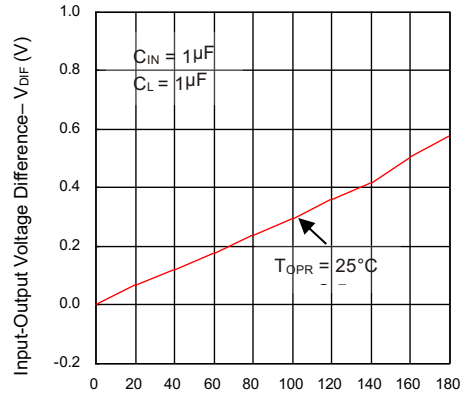


Figure 2: Input/ Output Voltage differential vs. Output Current

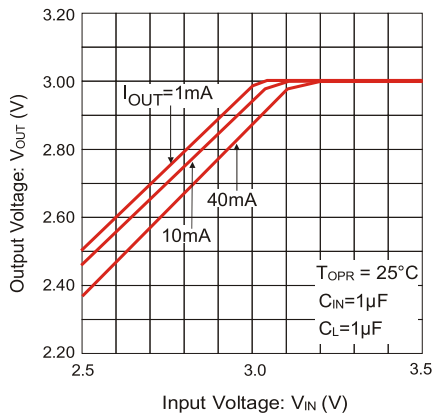


Figure 3: Output Voltage vs. Input voltage

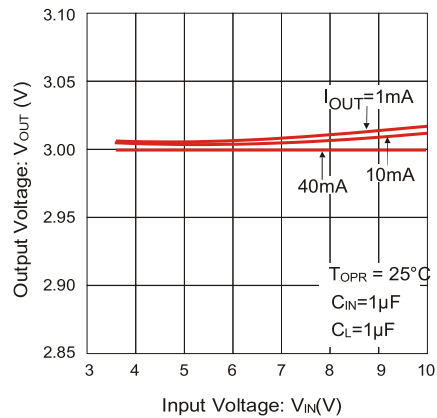


Figure 4: Output Voltage vs. Input voltage

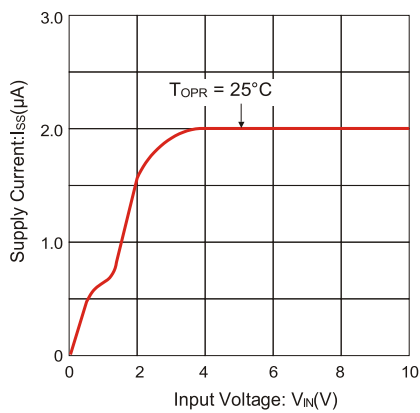


Figure 5: Supply Current vs. Input Voltage

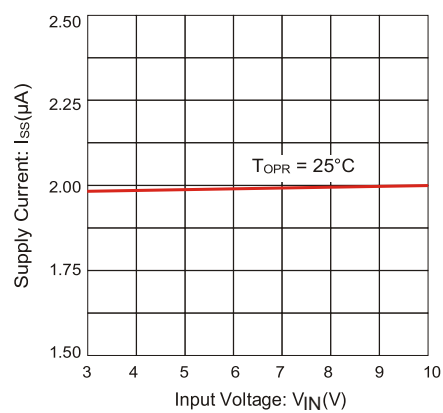


Figure 6: Supply Current vs. Input Voltage

Typical Performance Characteristics (for GM6250L-3.0, continued)

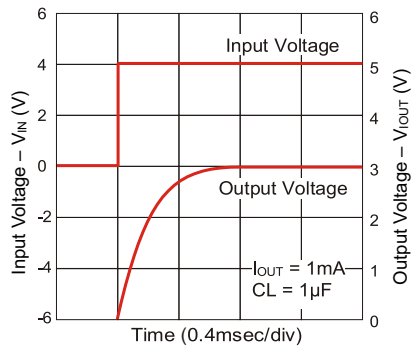


Figure 7: Input Transient Response 1

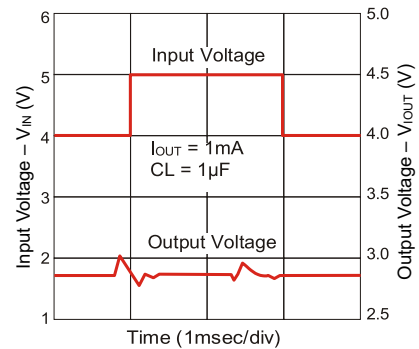


Figure 8: Input Transient Response 2

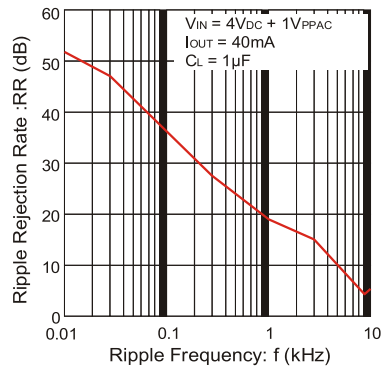
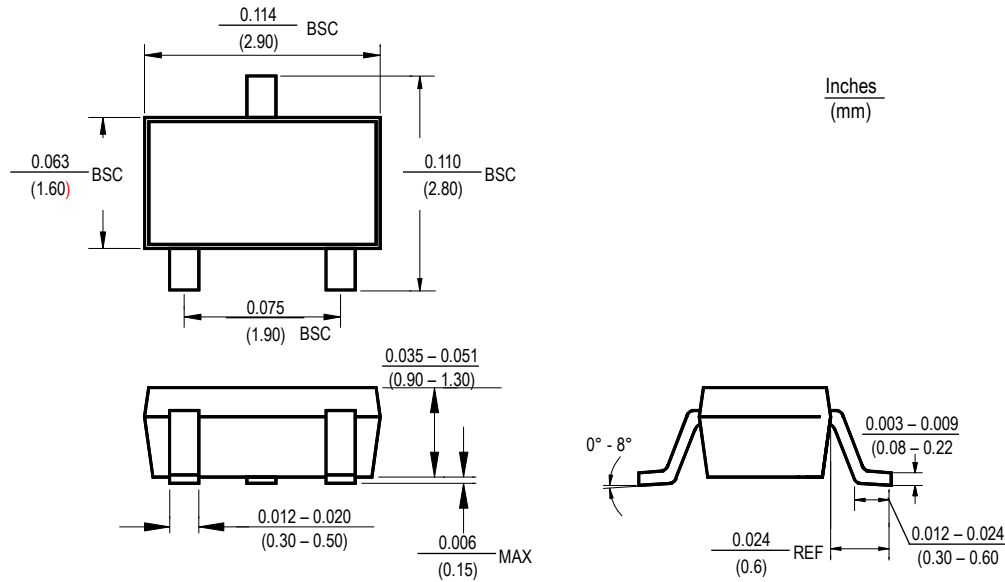


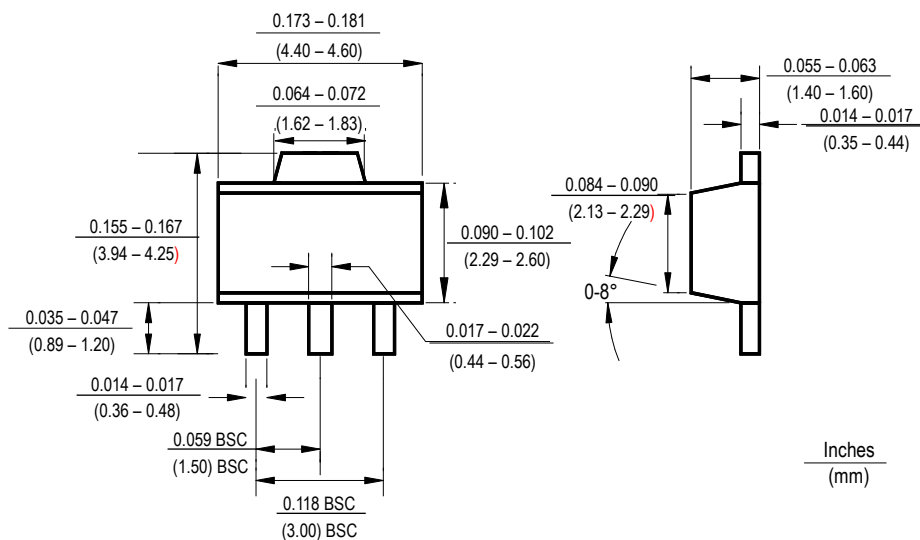
Figure 9: Ripple Rejection Rate

Package Outline Dimensions – SOT 23



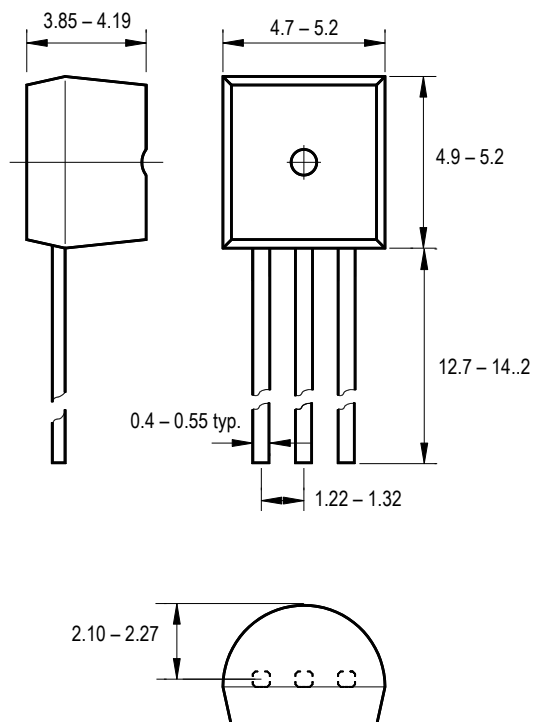
Note: All dimensions for SOT23 package are subject to change due to manufacturing concerns. However, they will be in full compliance with JEDEC MO-178C standard.

Package Outline Dimensions – SOT 89



Note: All dimensions for SOT89 package are subject to change due to manufacturing concerns. However, they will be in full compliance with JEDEC TO-243c standard.

Package Outline Dimensions – TO 92





GAMMA
MICROELECTRONICS

GM6250L

**300mA ULTRA LOW DROPOUT
POSITIVE VOLTAGE REGULATOR**

Ordering Number

GM 6250L - 2.2 T92 B G

APM Gamma Micro	Circuit Type	Output Voltage	Package Type	Shipping Type	
		2.2 = 2.2V	T92: TO 92	B: Bag	G:Green
		2.5 = 2.5V	ST89: SOT 89	T: Tube	
		3.3 = 3.3V	ST23: SOT 23	R: Tape & Reel	
		5.0 = 5.0V			

Note:

Green products:

- ♦ Lead-free (RoHS compliant)
- ♦ Halogen free(Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight)