5-V Low-Drop Voltage Regulator

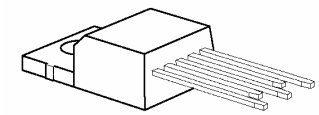
ILE4260-2

ILE 4260 is a 5-V low-drop fixed-voltage regulator in P-TO220-5 package. The maximum input voltage is 42 V (65 V≤ 400 ms). The device can produce an output current of more than 500 mA. It is shortcircuit-proof and incorporates temperature protection that disables the circuit at unpermissibly high temperatures.

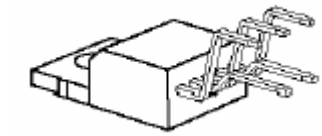
Due to the wide temperature range of – 40 to 150 °C, the ILE 4260 is also suitable for use in automotive applications.

The IC regulates an input voltage *V*I in the range 6 < V_I < 35 V to $V_Q$nominal =5.0 V. A reset signal is generated for an output voltage of V_Q < 4.75 V. The reset delay can be set externally with a capacitor. If the output current is reduced below 10 mA, the regulator switches internally to standby and the reset generator is turned off.
The standby current drops to max. 700 µA.

ILE4260S-2



ILE4260-2



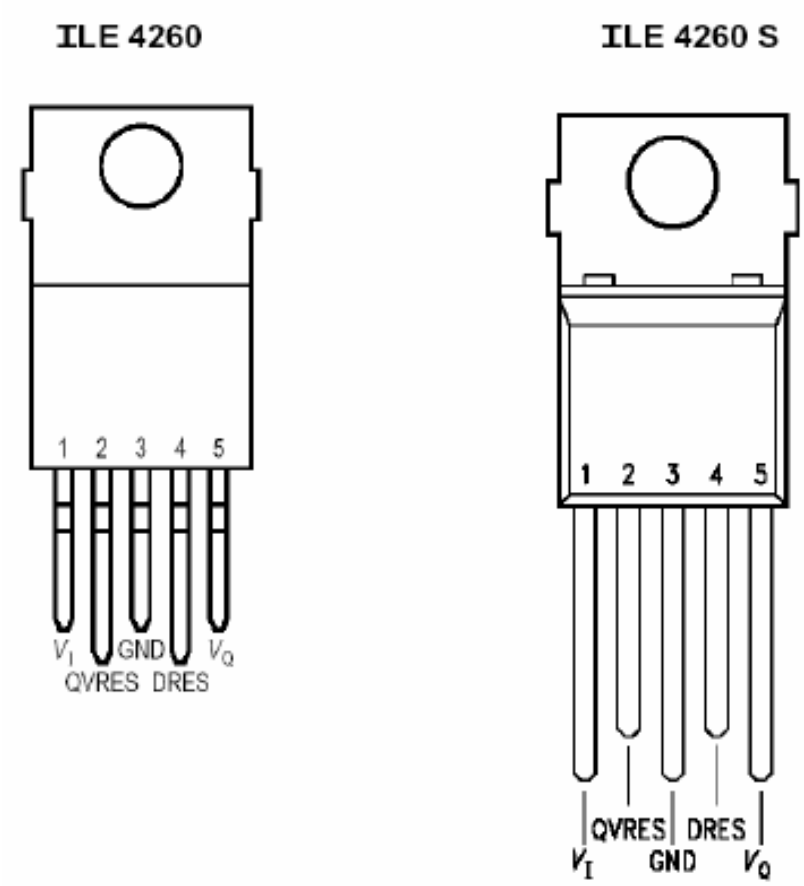
ILE 4260S-2	P-TO220-5-2
ILE 4260-2	P-TO220-5-1

T_A = -40° ÷ 125° C for all packages

Features

- Low-drop voltage
- Very low quiescent current
- Low starting current consumption
- Integrated temperature protection
- Protection against reverse polarity
- Input voltage up to 42 V
- Overvoltage protection up to 65 V (≤ 400 ms)
- Short-circuit proof
- Suited for automotive electronics
- Wide temperature range

Pin Configuration
(top view)



Pin Definitions and Functions (ILE 4260 and ILE 4260 S)

Pin No.	Symbol	Function
1	V_I	**Input**; block directly to ground at the IC by a 470-nF capacitor
2	QVRES	**Reset output**; open collector output controlled by the reset delay
3	GND	**Ground**
4	DRES	**Reset delay**; wired to ground with a capacitor
5	V_Q	**5-V output voltage**; block to ground with a 22-µF capacitor

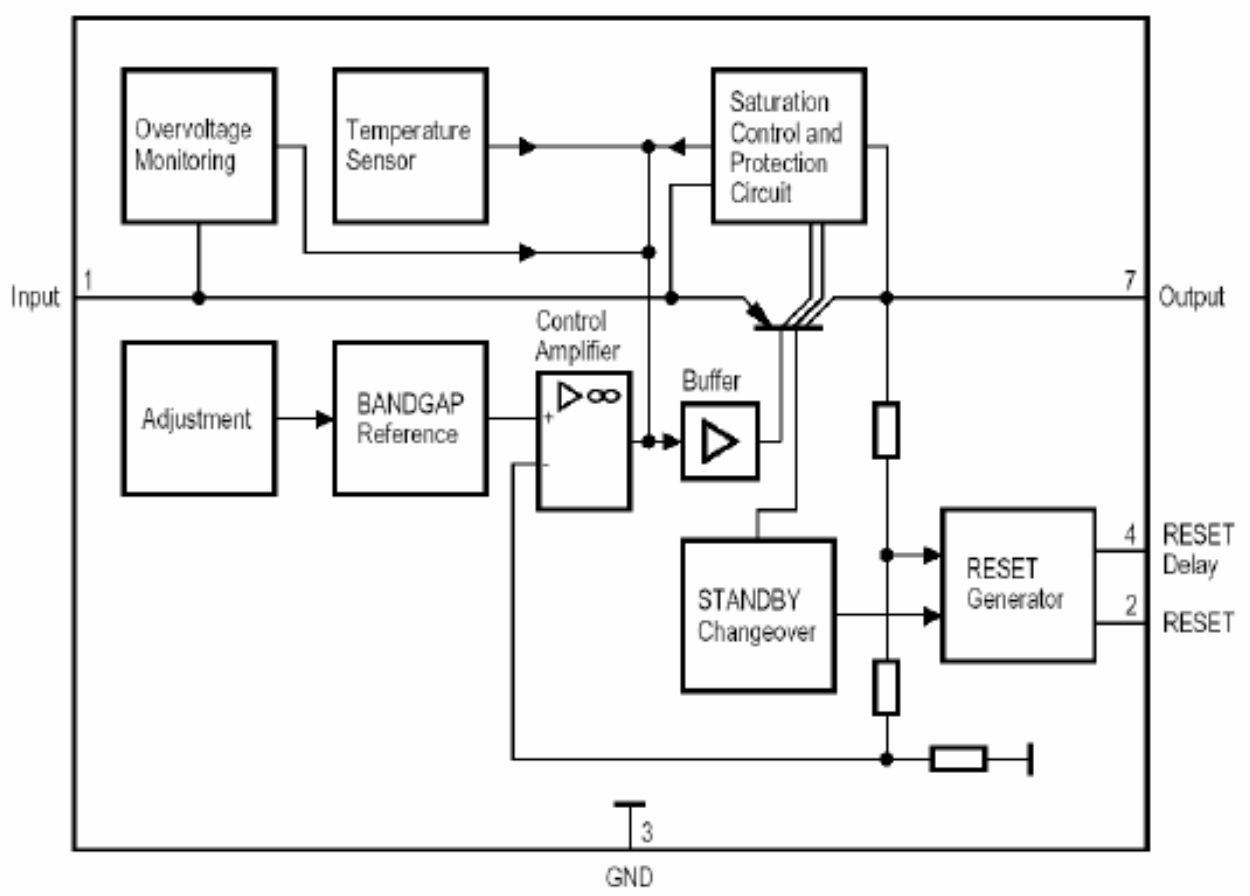
Circuit Description

The control amplifier compares a reference voltage, which is kept highly accurate by resistance adjustment, to a voltage that is proportional to the output voltage and drives the base of the series transistor via a buffer. Saturation control as a function of the load current prevents any over-saturation of the power element. If the output voltage goes below 96% of its typical value, an external capacitor is discharged on pin 4 by the reset generator. If the voltage on the capacitor reaches the lower threshold V_{ST}, a reset signal is issued on pin 2 and not cancelled again until the upper threshold V_{DT} is exceeded. For an output current of less than $I_{QN\ Off}$ = 10 mA the standby changeover turns off the reset generator. The latter is turned on again when the output current increases, the output voltage drops below 4.2 V or the delay capacitor is discharged by external measures.

The IC also incorporates a number of internal circuits for protection against:

- Overload
- Overvoltage
- Overtemperature
- Reverse polarity

Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Limit Values		Unit	Remarks
		min	max		
Input (Pin 1)					
Input voltage	V_I V_I	– 42 –	42 65	V V	– $t \leq 400$ ms
Input current	I_I	–	1.6	A	–
Reset Output (Pin 2)					
Voltage	V_R	–0.3	42	V	–
Current	I_R	–	–	–	internally limited
Ground (Pin 3)					
Current	I_{GND}	–0.5	–	A	–
Reset Delay (Pin 4)					
Voltage	V_D	– 0.3	42	V	–
Current	I_D	–	–	–	internally limited
Output (Pin 5)					
Differential voltage	$V_I - V_Q$	– 5.25	V_I	V	–
Current	I_Q	–	1.4	A	–
Temperature					
Storage temperature	T_{stg}	– 50	150	°C	–
Operating Range					
Input voltage	V_I	–	32	V	1)
Junction temperature	T_j	– 40	165	°C	–
Thermal Resistances					
Junction ambient	R_{thja}	–	65	K/W	–
Junction case	R_{thjc}	–	3	K/W	–

1) See diagram “Output Current versus Input Voltage”

Characteristics

V_I = 13.5 V; T_j = 25 °C; (unless otherwise specified)

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Normal Operation						
Output voltage	V_Q	4.75	5.0	5.25	V	25 mA ≤ I_Q ≤ 500 mA 6 V ≤ V_I ≤ 28 V – 40 °C ≤ T_j ≤ 125 °C
Short -circuit current	I_{SC}	500	1000	–	mA	V_I =17 V to 28 V; V_Q = 0 V
Current consumption $I_q = I_I – I_Q$	I_q	–	8.5	10	mA1)	6 V ≤ V_I ≤ 28 V I_Q = 150 mA
Current consumption $I_q = I_I – I_Q$	I_q	–	50	65	mA1)	6 V ≤ V_I ≤ 28 V IQ = 500 mA
Current consumption $I_q = I_I – I_Q$	I_q	–	–	80	mA1)	V_I ≤ 6 V I_Q = 500 mA
Drop voltage	V_{DR}	–	0.35	0.5	V	VI = 4.5 V; I_Q = 0.5 A
Drop voltage	V_{DR}	–	0.2	0.3	V	VI = 4.5 V; I_Q = 0.15 A
Load regulation	ΔV_Q	–	15	35	mV	25mA≤ I_Q ≤ 500 mA
Supply-voltage regulation	ΔV_Q	–	15	50	mV	V_I ≤ 6 V to 28 V; I_Q = 100 mA
Supply-voltage regulation	ΔV_Q	–	5	25	mV	V_I ≤ 6 V to 16 V; I_Q = 100 mA
Ripple rejection	SVR	–	54	–	dB	f = 100 Hz; V_r = 0.5 V_{pp}
Temperature drift of output voltage1)	α_{VQ}	–	2× 10_{-4}	–	1/°C	–
Standby Operation						
Quiscent current; $I_q = I_I – I_Q$	I_q	–	500	700	µA	10V ≤ V_I ≤ 16 V; I_Q = 0mA
Quiscent current; $I_q = I_I – I_Q$	I_q	–	750	850	µA	10V ≤ V_I ≤ 16 V; I_Q = 5mA

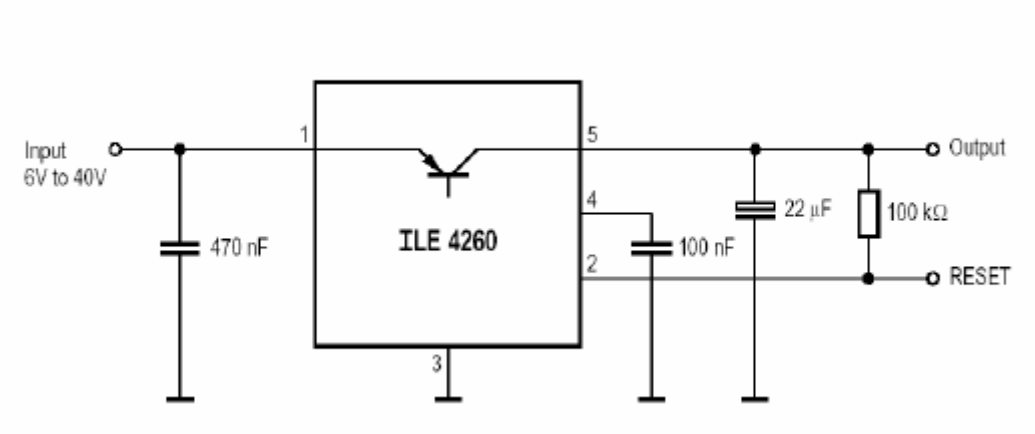
Characteristics (cont'd)

V_I = 13.5 V; T_j = 25 °C; (unless otherwise specified)

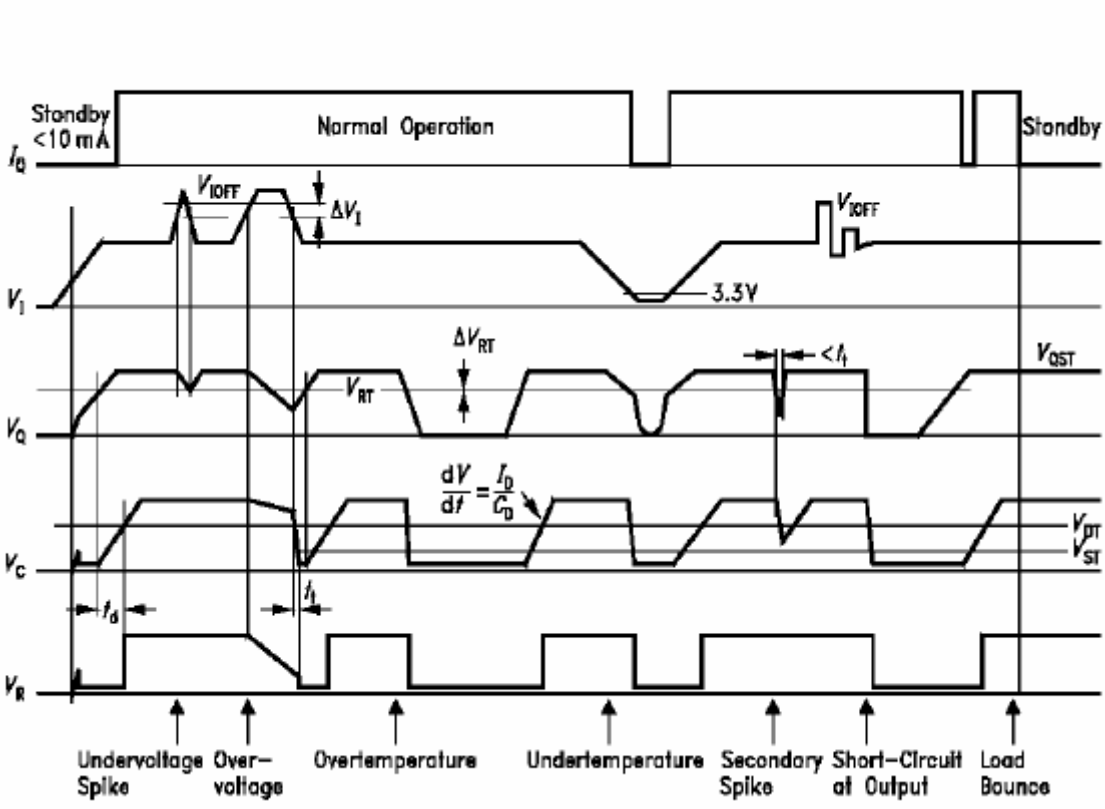
Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Standby Off/Normal On						
Current consumption	I_{qSOFF}	–	1.0	1.2	mA	see test diagram
Current consumption	I_{qNON}	–	1.7	2.2	mA	see test diagram
Normal Off/Standby On						
Current consumption	I_{qNOFF}	–	1.55	2.00	mA	see test diagram
Current consumption	I_{qSON}	–	850	1050	µA	see test diagram
Switching threshold	I_{QNOFF}	7.5	10	12.5	mA	see test diagram
Switching hysteresis	ΔIQ	2.25	3	4	mA	see test diagram
Reset Generator						
Switching threshold	V_{RT}	94	96	97	%	in % of V_Q; I_Q > 500mA;V_I = 6 V
Saturation voltage	V_R	–	0.25	0.40	V	I_R = 3 mA;V_I = 4.5 V
Reverse current	I_R	–	–	1	µA	V_R = 5 V
Charge current	I_D	7	10	13	µA	–
Switching threshold	V_{ST}	0.9	1.1	1.3	V	–
Delay switching threshold	V_{DT}	2.15	2.50	2.75	V	–
Delay time	t_D	–	25	–	ms	C_D = 100 nF
Delay time	t_t	–	5	–	µs	C_D = 100 nF
General Data						
Turn-Off voltage	V_{IOFF}	40	43	45	V	I_Q < 1 mA
Turn-Off hysteresis	ΔV_I	–	3.0	–	V	–
Leakage current	I_{QS}	–	500	–	µA	V_Q = 0 V; V_I = 45 V
Reverse output current	I_{QR}	–	–	1.5	mA	V_Q = 5 V; V_I = open

1) See diagram

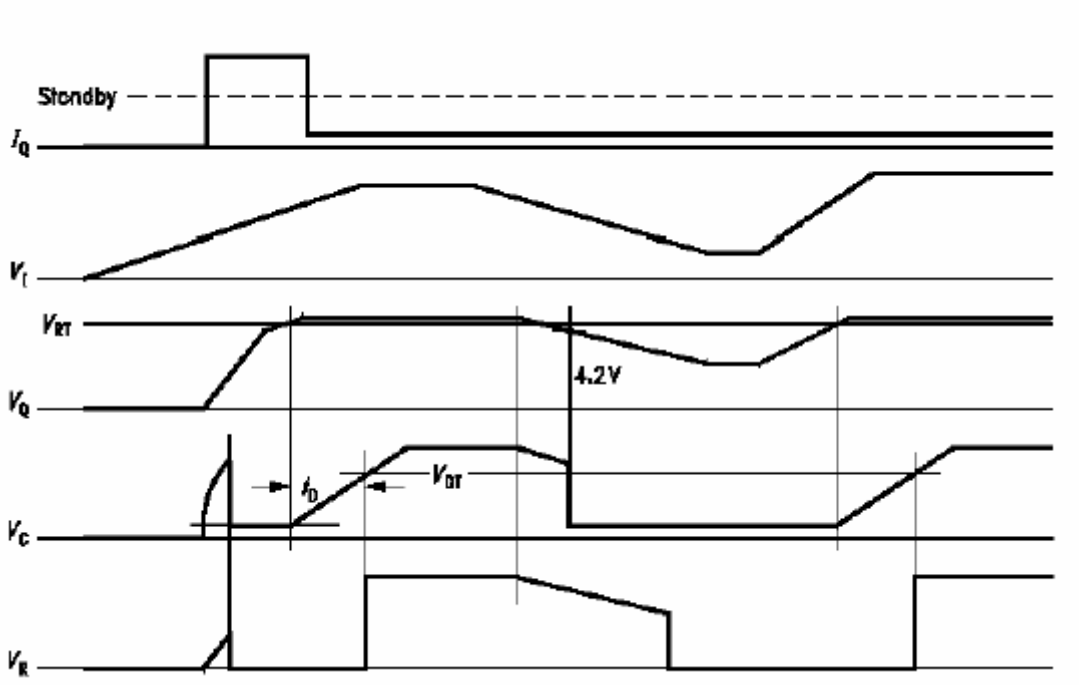
Application Circuit



Time Responce

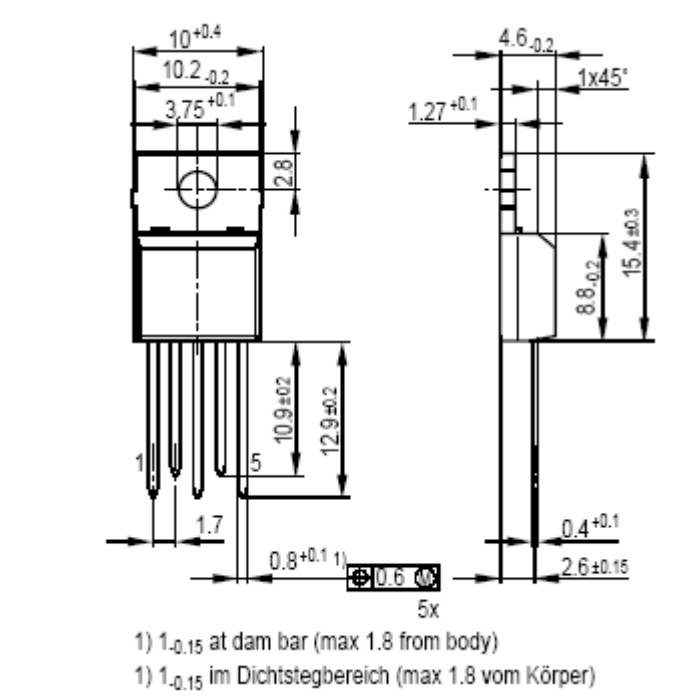


Time Response in Standby Condition



Package Dimensions

P-TO220-5-2



P-TO220-5-1