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1 Diagram







2 Pin configuration







3 Maximum ratings

Symbol	Parameter	Value	Unit
Vo	Output voltage	50	V
V _{IN}	Input voltage (for ULQ2003A/D1 - 2004A/D1)	30	V
۱ _C	Continuous collector current	500	mA
Ι _Β	Continuous base current	25	mA
T _A	Operating ambient temperature range	-40 to 105	°C
T _{STG}	Storage temperature range	-55 to 150	°C
TJ	Junction temperature	150	°C

Table 2. Absolute maximum ratings

Table 3. Thermal data

Symbol	Parameter	DIP-16	SO16	Unit
R _{thJA}	Thermal resistance junction-ambient, max.	70	120	°C/W



4 Electrical characteristics

 T_J = -40 to 105 °C for DIP16 unless otherwise specified, T_J = -25 to 105 °C for SO16 unless otherwise specified.

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit			
losy		V _{CE} = 50V, (<i>Figure 3</i>)			50				
	Output leakage current	T _J = 105°C, V _{CE} = 50V (<i>Figure 3</i>)			100	uА			
UEX		$T_J = 105^{\circ}C$ for ULQ2004, $V_{CE}=50V$, $V_I = 1V$ (<i>Figure 4</i>)			500				
		I _C = 100mA, I _B = 250μA		0.9	1.1				
V _{CE(SAT)}	Collector-emitter saturation voltage (<i>Figure 5</i>)	Ι _C = 200mA, Ι _B = 350μA		1.1	1.3	V			
		$I_{\rm C} = 350 {\rm mA}, I_{\rm B} = 500 {\rm \mu A}$		1.3	1.6				
		for ULQ2003, V _I = 3.85V		0.93	1.35				
I _{I(ON)}	Input current (<i>Figure 6</i>)	for ULQ2004, V _I = 5V		0.35	0.5	mA			
		for ULQ2004, V _I = 12V		1	1.45				
I _{I(OFF)}	Input current (Figure 7)	T _J = 105°C, I _C = 500μA	50	65		μA			
V _{I(ON)}	Input voltage (<i>Figure 8</i>)	for ULQ2003 $V_{CE}= 2V$, $I_C = 200MA$ $V_{CE}= 2V$, $I_C = 250MA$ $V_{CE}= 2V$, $I_C = 300MA$ for ULQ2004 $V_{CE}= 2V$, $I_C = 125MA$ $V_{CE}= 2V$, $I_C = 200MA$ $V_{CE}= 2V$, $I_C = 275MA$ $V_{CE}= 2V$, $I_C = 350MA$			2.4 2.7 3 5 6 7 8	V			
h _{FE}	DC forward current gain (<i>Figure 5</i>)	for ULQ2001, $V_{CE} = 2V$, $I_C = 350$ mA	1000						
CI	Input capacitance			15	25 ⁽¹⁾	pF			
t _{PLH}	Turn-on delay time	0.5 V _I to 0.5V _O		0.25	1 ⁽¹⁾	μs			
t _{PHL}	Turn-off delay time	0.5 V _I to 0.5V _O		0.25	1 ⁽¹⁾	μs			
I _R	Clamp diode leakage current	$V_{R} = 50V$		50					
	(Figure 9)	$T_{\rm J} = 105^{\circ}{\rm C}, V_{\rm R} = 50{\rm V}$			100	μΑ			
V _F	Clamp diode forward voltage (<i>Figure 10</i>)	I _F = 350mA		1.7	2	V			

 Table 4.
 Electrical characteristics

1. Guaranteed by design.



 T_J = -40 to 125 $^\circ C$ for SO16 unless otherwise specified.

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
I _{CEX}	Output leakage current (<i>Figure 3</i>)	V _{CE} = 50V			50	μA
		$I_{\rm C} = 100 {\rm mA}, I_{\rm B} = 250 {\rm \mu A}$		0.9	1.1	
V _{CE(SAT)}	Collector-emitter saturation	I _C = 200mA, I _B = 350μA		1.1	1.3	V
		Ι _C = 350mA, Ι _B = 500μA		1.3	1.6	
I _{I(ON)}	Input current (<i>Figure 6</i>)	V _I = 3.85V		0.93	1.35	mA
I _{I(OFF)}	Input current (<i>Figure 7</i>)	I _C = 500μA	50	65		μA
V _{I(ON)}	Input voltage (Figure 8)	$V_{CE} = 2V, I_C = 200mA$ $V_{CE} = 2V, I_C = 250mA$ $V_{CE} = 2V, I_C = 300mA$			2.4 2.7 3	V
Cl	Input capacitance			15	25	pF
t _{PLH}	Turn-on delay time	0.5 V _I to 0.5V _O		0.25	1	μs
t _{PHL}	Turn-off delay time	0.5 V _I to 0.5V _O		0.25	1	μs
I _R	Clamp diode leakage current (<i>Figure 9</i>)	V _R = 50V			50	μΑ
V _F	Clamp diode forward voltage (<i>Figure 10</i>)	I _F = 350mA		1.7	2	V

Table 5. Electrical characteristics for ULQ2003D1013TRY (Automotive Grade)



5 Test circuits



Figure 5. Collector-emitter saturation voltage Figure 6. Input current (ON)



Figure 7. Input current (OFF)





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6 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK[®] is an ST trademark.



	Plastic DIP-16 (0.25) mechanical data					
Dim	mm.					
Dim.	Min.	Тур.	Max.	Min.	Тур.	Max.
a1	0.51			0.020		
В	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
е		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



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DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
А			1.75			0.069
a1	0.1		0.25	0.004		0.009
a2			1.6			0.063
b	0.35		0.46	0.014		0.018
b1	0.19		0.25	0.007		0.010
С		0.5			0.020	
c1			45°	(typ.)		
D ⁽¹⁾	9.8		10	0.386		0.394
Е	5.8		6.2	0.228		0.244
е		1.27			0.050	
e3		8.89			0.350	
F ⁽¹⁾	3.8		4.0	0.150		0.157
G	4.60		5.30	0.181		0.208
L	0.4		1.27	0.150		0.050
М			0.62			0.024
S	8 ° (max.)					
(1) "D" and "F" do not include mold flash or protrusions - Mold flash or protrusions shall not exceed 0.15mm (.006inc.)						





7 Revision history

Date	Revision	Changes
05-Dec-2006	2	Order codes updated.
23-May-2007	3	Order codes updated.
17-Apr-2008	4	Added new order codes for Automotive grade products see <i>Table 1 on page 1</i> .
25-Aug-2008	5	Modified: Table 4 on page 6 and Table 5 on page 7.
11-Feb-2011	6	Modified: $T_J = -25$ to 105 °C <i>Table 4 on page 6</i> .



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