

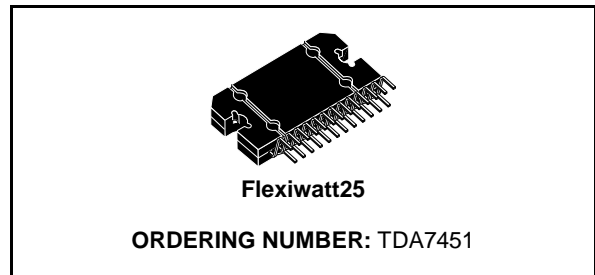


# TDA7451

## 4x7W OR 2x22W CAR RADIO POWER AMPLIFIER PLUS TRIPLE POWER SUPPLY

PRELIMINARY DATA

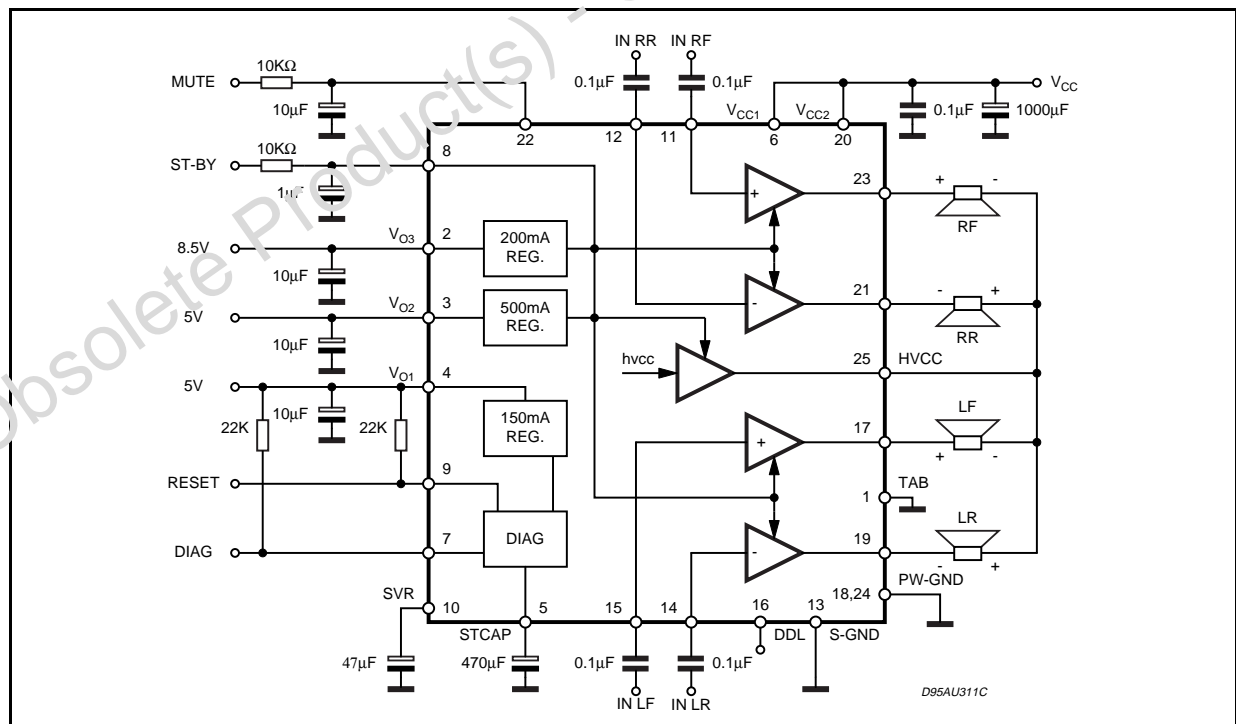
- HIGH OUTPUT POWER CAPABILITY:
  - 4 x 9.5W OR 2 x 32W/4Ω MAX
  - 4 x 8.5W OR 2 x 28W/4Ω EIAJ
  - 4 x 7W OR 2 x 22W/4Ω @14.4V, 1KHz; 10%
- MINIMIZED EXTERNAL COUNT
  - NO NEED OF DECOUPLING CAPACITORS
  - NO NEED OF BOOTSTRAP CAPACITOR
  - NO NEED OF EXTERNAL COMPENSATION
  - INTERNALLY FIXED GAIN (20dB)
- POP-FREE AUDIO SECTION
- ST-BY FUNCTION (C-MOS)
- MUTE FUNCTION (C-MOS)
- CLIP DETECTOR, THERMAL WARNING, SHORT CIRCUIT DETECTION
- BUILT-IN VOLTAGE REGULATORS:
  - 5V @ 150mA WITH RESET
  - 5V @ 500mA WITH ST-BY
  - 8.5V @ 200mA WITH ST-BY
- REGULATORS DIAGNOSTIC FEATURE: UNDERVOLTAGE, 8.5V DROP SENSE, SHORT CIRCUIT, LOAD DUMP, OVER-TEMPERA-



### TURE PROTECTIONS

- General:**
- LOAD DUMP
  - OVERRATING CHIP TEMPERATURE
- Audio Section:**
- OUT SHORT (TO GND, TO Vs AND ACROSS THE LOAD)
- Power Supply Section:**
- SHORT CIRCUIT PROTECTION (OUT TO GND)

### BLOCK DIAGRAM

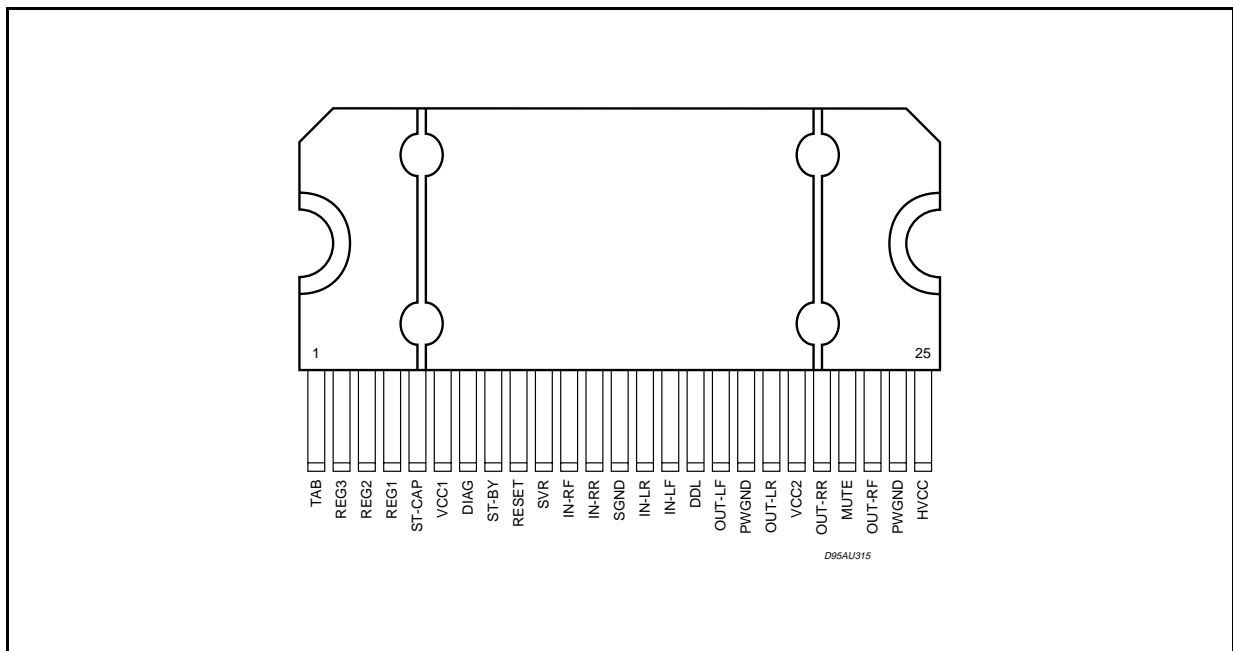


# TDA7451

## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_S$	Operating Supply Voltage	18	V
$V_S$	DC Supply Voltage	28	V
$V_S$	Peak Supply Voltage (t = 50ms)	40	V
$I_o$	Audio Output Peak Current (non repetitive t = 100μs)	4	A
	Audio Output Peak Current (repetitive f > 10Hz)	3	A
$I_o$	Voltage Regulators Output Current	internally limited	
$P_{tot}$	Power Dissipation at $T_{case} = 85^{\circ}C$	55	W
$T_{stg}, T_j$	Storage and Junction Temperature Range	-40 to 150	$^{\circ}C$
$V_{out}$	Output Voltages (DIAG, RESET)	7	V
$V_{in}$	Input Voltages (ST-BY, MUTE)	18	V
RESR	Output capacitor series resistance	0.2 to 10	$\Omega$

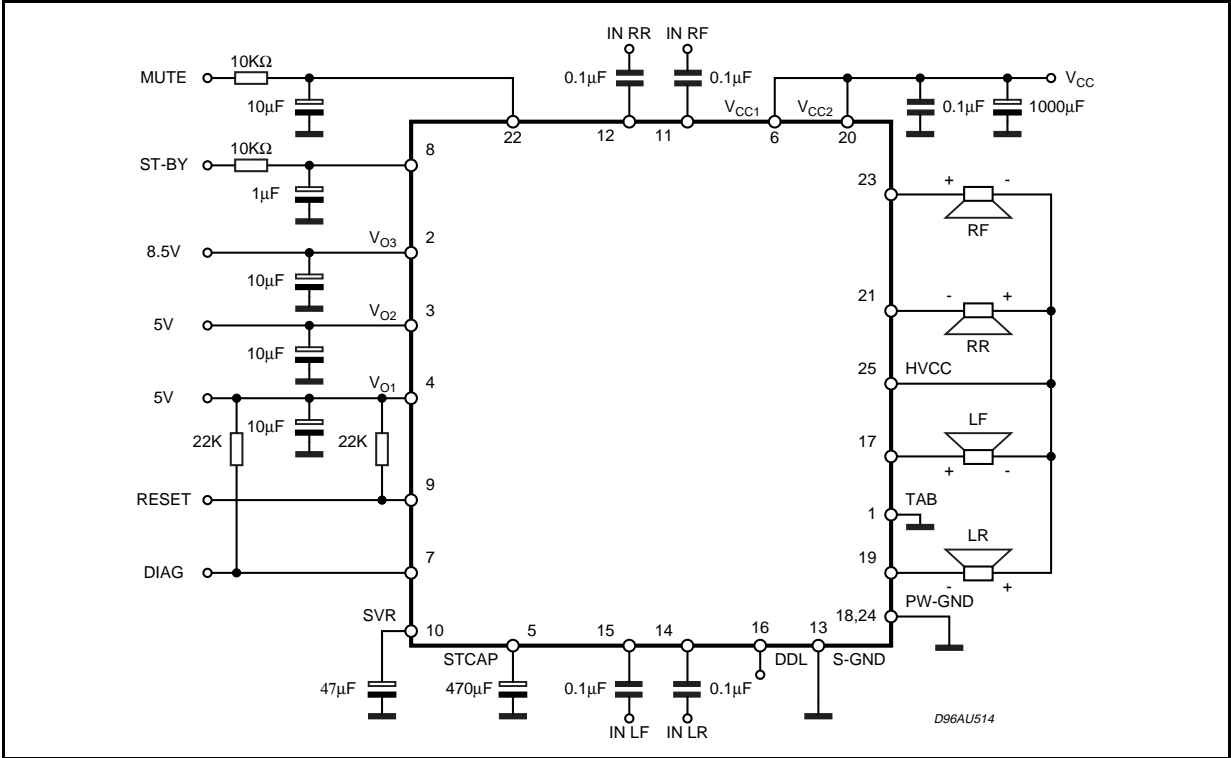
## PIN CONNECTION



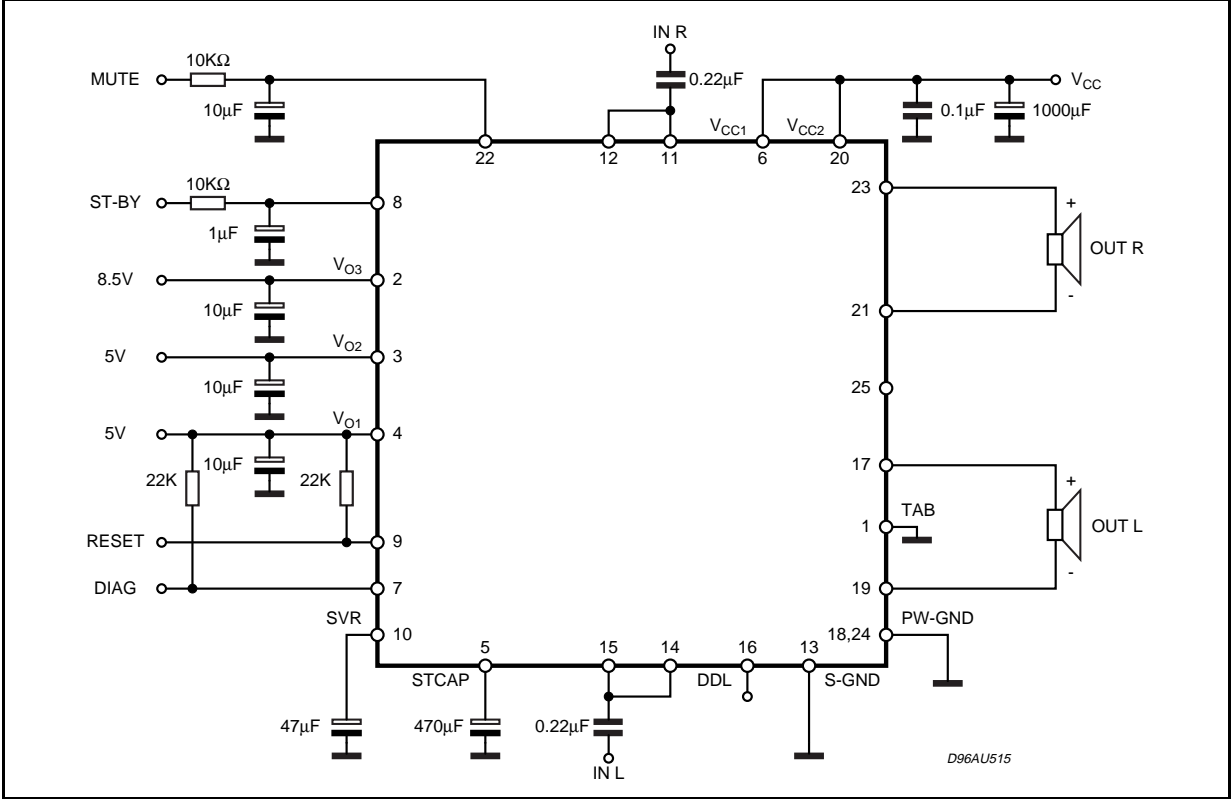
## THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{th\ j-case}$	Thermal Resistance Junction-case	1.2	$^{\circ}C/W$

P<sub>O</sub> = 4 X 7W S.E. APPLICATION



P<sub>O</sub> = 2 X 22W BTL APPLICATION



## TDA7451

**ELECTRICAL CHARACTERISTICS** (Refer to the test circuit;  $V_S = 14.4V$ ;  $R_L = 4\Omega$ ,  $T_{amb} = 25^\circ C$ ,  $f = 1kHz$ , unless otherwise specified)

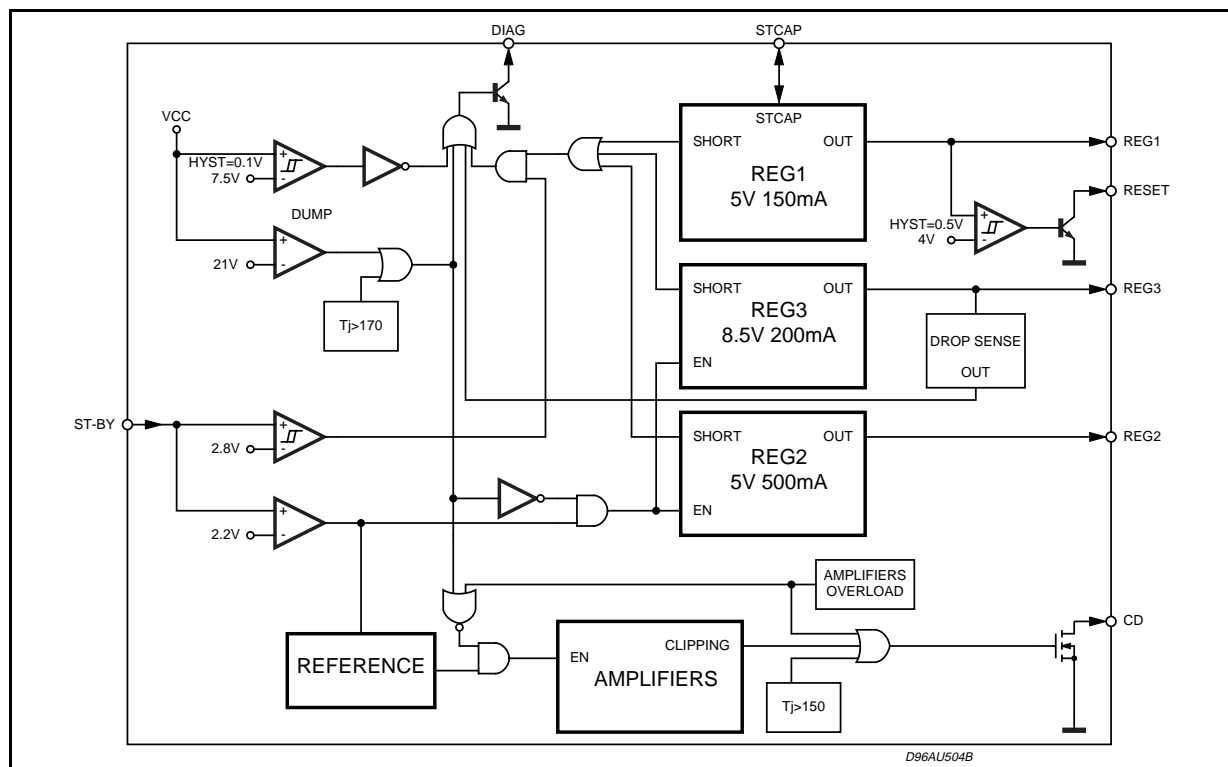
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>GENERAL</b>						
$I_q$	Total Quiescent Current	$I_{L01}, I_{L02}, I_{L03} = 5mA$		80	150	mA
$V_{SB\ IN}$	ST-BY IN Threshold Voltage				1.5	V
$V_{SB\ OUT}$	ST-BY OUT Threshold Voltage		3.5			V
$I_{ST-BY}$	Stand-by Current Consumption	$I_{L01} = 2mA$			0.5	mA
<b>AUDIO SECTION</b>						
$P_O$	Output Power	$R_L = 4\Omega$ ; THD = 10% Bridge Single Ended	19 6	22 7		W W
$P_{O\ EIAJ}$	EIAJ Output Power (**)	$V_S = 13.7V$ Bridge Single Ended	26 7.5	28 8.5		W W
$P_{O\ max.}$	Max. Output Power (**)	$V_S = 14.4V$ Bridge Single Ended	30 8	32 9.5		W W
d	Distortion	$R_L = 4\Omega$ ; Single Ended, $P_O = 0.1$ to 3W Bridge, $P_O = 0.1$ to 8W		0.04 0.06	0.3 0.3	% %
CT	Cross Talk	$f = 1kHz$ ; $R_g = 0$ $f = 10kHz$ ; $R_g = 0$	50	60 55		dB dB
$R_{IN}$	Input Impedance	Single Ended Bridge	70 35	100 50	130 65	K $\Omega$ K $\Omega$
$G_V$	Voltage Gain	Single Ended Bridge	19 25	20 26	21 27	dB dB
$G_V$	Voltage Gain Match.				1	dB
BW	Bandwidth	-3dB	100			KHz
$E_{NO}$	Output Noise Voltage (*)	$R_g = 0$ ; Single Ended		100		$\mu V$
SVR	Supply Voltage Rejection	$R_g = 0$ ; $f = 100Hz$ ; Single Ended	48	55		dB
ASB	Stand-by Attenuation		90	100		dB
$I_{PIN8}$	ST-BY Pin Current	Play mode; $V_{pin8} = 5V$	-10		30	$\mu A$
$A_M$	MUTE Attenuation		80	90		dB
$V_{M\ IN}$	MUTE IN Threshold Voltage				1.5	V
$V_{M\ OUT}$	MUTE OUT Threshold Voltage		3.5			V
$I_{CD}$	Clipping Detector Current (Pull up to 5V with 10K $\Omega$ )	CDOff: $P_{Omin} = 3.5W$			5	$\mu A$
		CDOn: THD = 5%	50	190	280	$\mu A$
<b>POWER SUPPLY SECTION</b>						
$V_{O1}$	Output Voltages	$I_{O1} = 5mA$	4.85	5	5.15	V
$\Delta V_{O1}$	Load Regulation 1	$I_{O1} = 5$ to 150mA			80	mV
$I_{LO1}$	Current Limit	$V_{O1} = 0V$	250	350	600	mA
$\Delta V_{O1}$	Dropout Voltages	$I_{O1} = 150mA$			700	mV
SVR	Ripple Rejection	$V_{ripple} = 1V_{pp}$ ; $I_{O1} = 50mA$ $f = 100Hz$ $f = 10KHz$	60			dB
			50			dB
$\Delta V_{O1}$	Line Regulation 1	$V_S = 8$ to 18V; $I_{O1} = 5mA$		10	40	mV
<b>RESET</b>						
Reset On	Low $V_{REG1}$ Reset On Threshold		3.5	4.0	4.7	V
Reset Off	Low $V_{REG1}$ Reset Off Threshold			4.25		V
Reset Hyst	Reset Threshold Hysteresis vs Reg 1			250	500	mV
$V_{out\ on\ Reset}$	Reset Output Voltage	Reset activated $R(Reset\ to\ V_{Reg1}) \geq 15K$			1.5	V

(\*) 22Hz to 22KHz

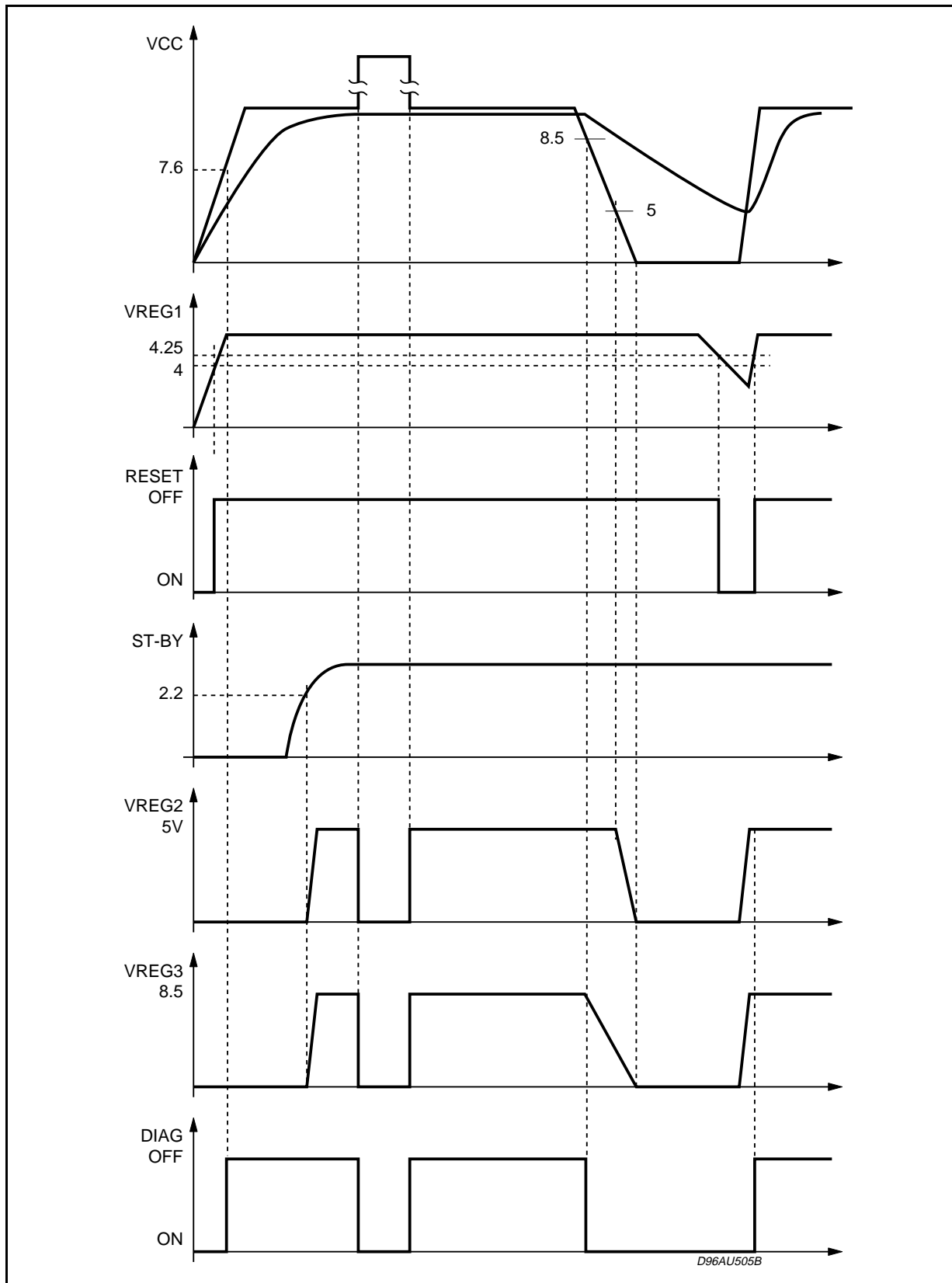
**ELECTRICAL CHARACTERISTICS** (continued)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>DIAGNOSTIC OUTPUT</b>						
Diag On Vs	Low Vs Diag. ON Threshold		7	7.5	8	V
Diag Off Vs	Low Vs Diag. OFF Threshold			7.6		V
Diag Hyst Vs	Low Vs Diag. Hysteresis			100	150	mV
Diag Dump	Diag. Threshold vs Overvoltage		20	21	22	V
Diag On Drop	V <sub>REG3</sub> Output Voltage Drop Before Diag. Activation	I <sub>O3</sub> = 100mA		90	200	mV
V <sub>out</sub> On Diag	Diag. Output Voltage	Diag activated R (Diag to V <sub>REG1</sub> ) ≥ 15K			1.5	V
V <sub>O2</sub>	Output Voltage 2	I <sub>O2</sub> = 5mA	4.85	5	5.15	V
ΔV <sub>O2</sub>	Load Regulation 2	I <sub>O2</sub> = 5 to 500mA			100	mV
I <sub>L02</sub>	Current Limit 2	V <sub>O2</sub> = 0V	0.8	1	1.5	A
ΔV <sub>O2</sub>	Dropout Voltage	I <sub>O2</sub> = 500mA		1	1.5	V
SVR	Ripple Rejection	V <sub>ripple</sub> = 1Vpp; I <sub>O2</sub> = 100mA f = 100Hz f = 10KHz	60 50			dB dB
ΔV <sub>O2</sub>	Line Regulation	V <sub>S</sub> = 8 to 18V, I <sub>O2</sub> = 5mA		10	40	mV
V <sub>O3</sub>	Output Voltage 3	I <sub>O3</sub> = 5mA	8.25	8.5	8.75	V
ΔV <sub>O3</sub>	Load Regulation 3	I <sub>O3</sub> = 5 to 200mA			80	mV
I <sub>L03</sub>	Current Limit 3		300	400	800	mA
ΔV <sub>O3</sub>	Dropout Voltage	I <sub>O3</sub> = 200mA			1	V
SVR	Ripple Rejection	V <sub>ripple</sub> = 1Vpp; I <sub>O3</sub> = 100mA f = 100Hz f = 10KHz	60 50			dB dB
ΔV <sub>O3</sub>	Line Regulation 3	V <sub>S</sub> = 11 to 18V, I <sub>O3</sub> = 5mA		10	40	mV

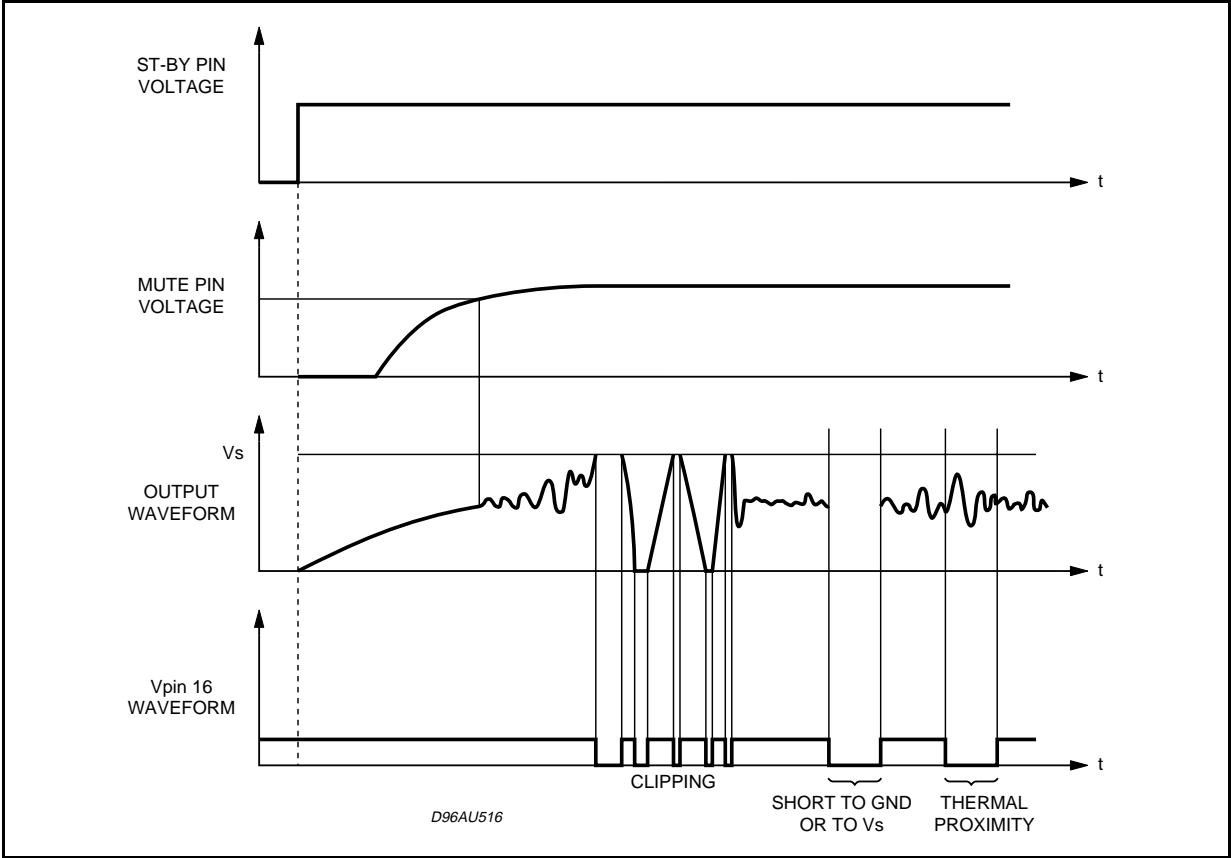
**DIAGNOSTIC DIAGRAM**



VOLTAGE SUPPLY SECTION WAVEFORMS



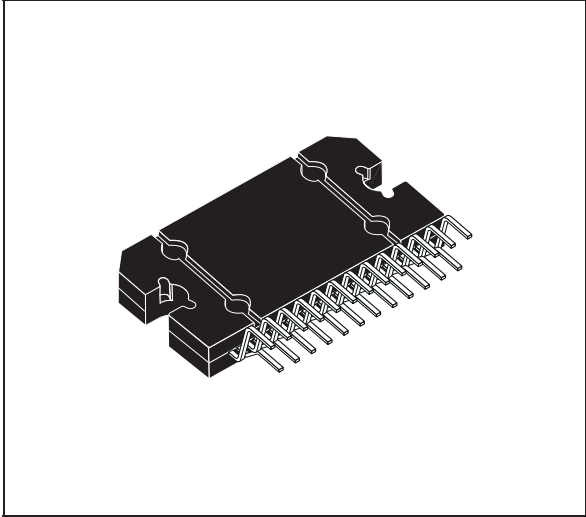
AUDIO SECTION WAVEFORMS



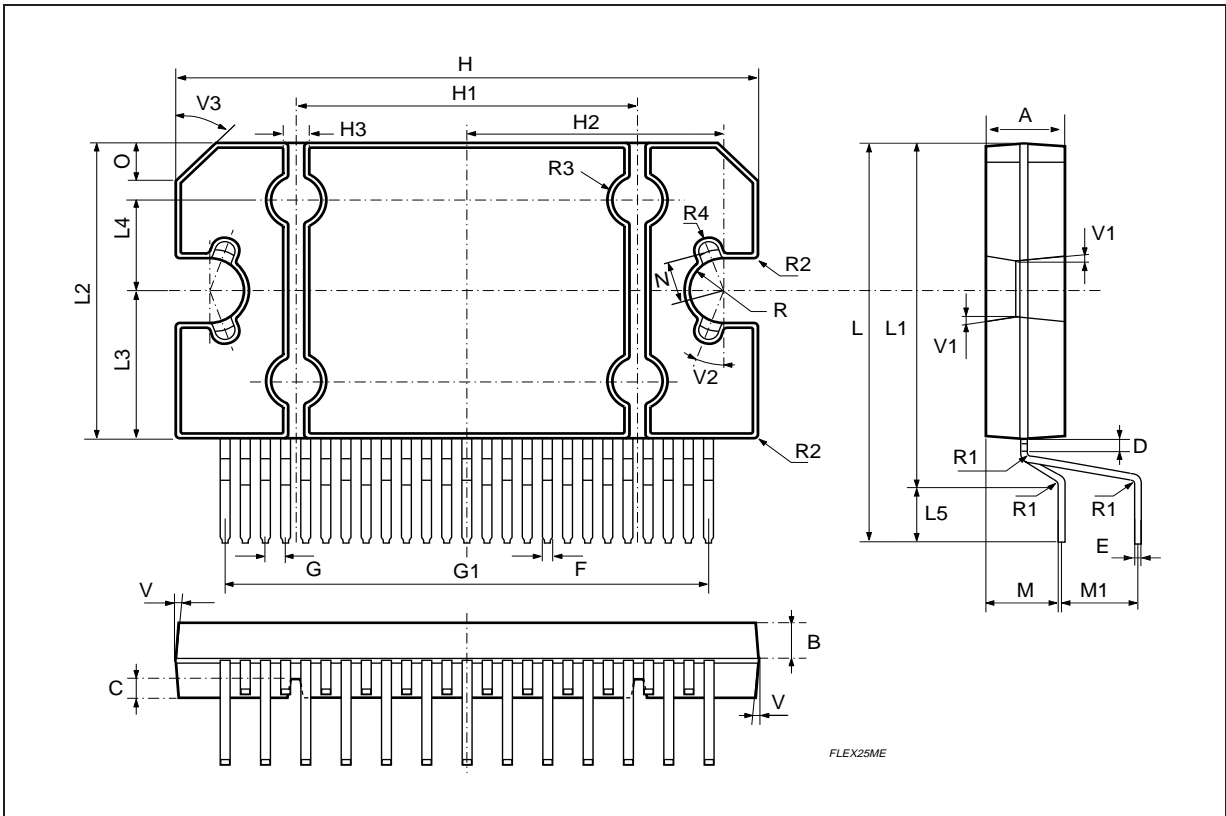
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.45	4.50	4.65	0.175	0.177	0.183
B	1.80	1.90	2.00	0.070	0.074	0.079
C		1.40			0.055	
D	0.75	0.90	1.05	0.029	0.035	0.041
E	0.37	0.39	0.42	0.014	0.015	0.016
F (1)			0.57			0.022
G	0.80	1.00	1.20	0.031	0.040	0.047
G1	23.75	24.00	24.25	0.935	0.945	0.955
H (2)	28.90	29.23	29.30	1.138	1.150	1.153
H1		17.00			0.669	
H2		12.80			0.503	
H3		0.80			0.031	
L (2)	22.07	22.47	22.87	0.869	0.884	0.904
L1	18.57	18.97	19.37	0.731	0.747	0.762
L2 (2)	15.50	15.70	15.90	0.610	0.618	0.626
L3	7.70	7.85	7.95	0.303	0.309	0.313
L4		5			0.197	
L5		3.5			0.138	
M	3.70	4.00	4.30	0.145	0.157	0.169
M1	3.60	4.00	4.40	0.142	0.157	0.173
N		2.20			0.086	
O		2			0.079	
R		1.70			0.067	
R1		0.5			0.02	
R2		0.3			0.12	
R3		1.25			0.049	
R4		0.50			0.019	
V			5° (Typ.)			
V1			3° (Typ.)			
V2			20° (Typ.)			
V3			45° (Typ.)			

(1): dam-bar protusion not included  
 (2): molding protusion included

**OUTLINE AND MECHANICAL DATA**



**Flexiwatt25**



FLEX25ME



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