

# SANYO Semiconductors **DATA SHEET**

# STK415-140-E 2-Channel Power Switching Audio Power IC, 120W+120W

#### Overview

The STK415-140-E is a class H audio power amplifier hybrid IC that features a built-in power supply switching circuit. This IC provides high efficiency audio power amplification by controlling (switching) the supply voltage supplied to the power devices according to the detected level of the input audio signal.

## **Applications**

• Audio power amplifiers.

#### **Features**

- Pin-to-pin compatible outputs ranging from 80W to 180W.
- Can be used to replace the STK416-100 series (3-channel models) and the class-AB series (2, 3-channel models) due to its pin compatibility.
- Pure complementary construction by new Darlington power transistors
- Output load impedance:  $R_L = 8\Omega$  to  $4\Omega$  supported
- Using insulated metal substrate that features superlative heat dissipation characteristics that are among the highest in the industry.

## **Series Models**

	STK415-090-E	STK415-100-E	STK415-120-E	STK415-130-E	STK415-140-E						
Output 1 (10%/1kHz)	80W×2 channels	90W×2 channels	120W×2 channels	150W×2 channels	180W×2 channels						
Output 2 (0.8%/20Hz to 20kHz)	50W×2 channels	60W×2 channels	80W×2 channels	100W×2 channels	120W×2 channels						
Max. rated V <sub>H</sub> (quiescent)	±60V	±65V	±73V	±80V	±80V						
Max. rated V <sub>L</sub> (quiescent)	±41V	±42V	±45V	±46V	±51V						
Recommended operating V <sub>H</sub> (8Ω)	±37V	±39V	±46V	±51V	±52V						
Recommended operating V <sub>L</sub> (8Ω)	±27V	±29V	±32V	±34V	±32V						
Dimensions (excluding pin height)	64.0mm×31.1mm×9.0mm										

- Any and all SANYO Semiconductor Co.,Ltd. products described or contained herein are, with regard to "standard application", intended for the use as general electronics equipment (home appliances, AV equipment, communication device, office equipment, industrial equipment etc.). The products mentioned herein shall not be intended for use for any "special application" (medical equipment whose purpose is to sustain life, aerospace instrument, nuclear control device, burning appliances, transportation machine, traffic signal system, safety equipment etc.) that shall require extremely high level of reliability and can directly threaten human lives in case of failure or malfunction of the product or may cause harm to human bodies, nor shall they grant any guarantee thereof. If you should intend to use our products for applications outside the standard applications of our customer who is considering such use and/or outside the scope of our intended standard applications, please consult with us prior to the intended use. If there is no consultation or inquiry before the intended use, our customer shall be solely responsible for the use.
- Specifications of any and all SANYO Semiconductor Co.,Ltd. products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

## **Specifications**

Absolute maximum ratings at Ta=25°C (excluding rated temperature items), Tc=25°C unless otherwise specified

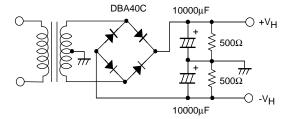
Parameter	Symbol	Conditions	Ratings	Unit
V <sub>H</sub> maximum quiescent supply voltage 1	V <sub>H</sub> max (1)	When no signal	±80	V
V <sub>H</sub> maximum supply voltage 2	V <sub>H</sub> max (2)	$V_{H} \max (2)$ $R_{L} \ge 6\Omega$		V
V <sub>H</sub> maximum supply voltage 3	V <sub>H</sub> max (3)	R <sub>L</sub> ≥4Ω	±60	V
V <sub>L</sub> maximum quiescent supply voltage 1	V <sub>L</sub> max (1)	When no signal	±51	V
V <sub>L</sub> maximum supply voltage 2	V <sub>L</sub> max (2)	R <sub>L</sub> ≥6Ω	±48	V
V <sub>L</sub> maximum supply voltage 3	V <sub>L</sub> max (3)	R <sub>L</sub> ≥4Ω	±36	V
Maximum voltage between V <sub>H and</sub> V <sub>L</sub> *4	V <sub>H</sub> -V <sub>L</sub> max	No loading	60	V
Standby pin maximum voltage	Vst max		-0.3 to +5.5	V
Thermal resistance	θј-с	Per power transistor	1.5	°C/W
Junction temperature	Tj max	Both the Tj max and Tc max conditions must be met.	150	°C
IC substrate operating temperature	Tc max		125	°C
Storage temperature	Tstg		-30 to +125	°C
Allowable load shorted time *3	ts	$V_{H}$ =±52V, $V_{L}$ =±32V, $R_{L}$ =6 $\Omega$ , f=50Hz, $P_{O}$ =120W, 1-channel active	0.3	s

## Electrical Characteristics at Tc=25°C, RL=8Ω (non-inductive load), Rg=600Ω, VG=40dB, VZ=15V

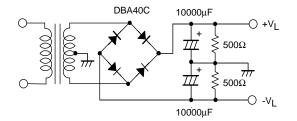
				Cond								
Parameter	Symbol		V (V)	f (Hz)	P <sub>O</sub> (W)	THD (%)		min	typ	max	unit	
Output power	P <sub>O</sub> (1)	V <sub>H</sub> V <sub>L</sub>	±52 ±32	20 to 20k		0.8		120				
	P <sub>O</sub> (2)	VH VL	±42 ±28	1k		0.8	R <sub>L</sub> =4Ω		120		W	
Total harmonic distortion	THD	V <sub>H</sub> V <sub>L</sub>	±52 ±32	20 to 20k	120				0.4		%	
Frequency characteristics	fL, fH	V <sub>H</sub> ±52 V <sub>L</sub> ±32			1.0 +0 -3		+0 -3dB		20 to 50k	(	Hz	
Input impedance	ri	V <sub>H</sub> V <sub>L</sub>	±52 ±32	1k	1.0				55		kΩ	
Output noise voltage *2	VNO	V <sub>H</sub> V <sub>L</sub>	±58 ±38				Rg=2.2kΩ			1.0	mVrms	
Quiescent current	Icco	٧H	±58				D			30	mA	
		٧L	±38				R <sub>L</sub> =∞			100	IIIA	
Output neutral voltage	٧N	∨ <sub>H</sub> ∨ <sub>L</sub>	±58 ±38					-70	0	+70	mV	
Pin 17 voltage when standby ON *7	VST ON	V <sub>H</sub> V <sub>L</sub>	±52 ±32				Standby		0	0.6	V	
Pin 17 voltage when standby OFF *7	VST OFF	V <sub>H</sub> V <sub>L</sub>	±52 ±32				Operating	2.5	3.0		V	

#### [Remarks]

- \*1: Unless otherwise specified, use a constant-voltage power supply to supply power when inspections are carried out.
- \*2: The output noise voltage values shown are peak values read with a VTVM. However, an AC stabilized (50Hz) power supply should be used to minimize the influence of AC primary side flicker noise on the reading.
- \*3: Use the designated transformer power supply circuit shown in the figure below for the measurements of allowable load shorted time and output noise voltage.
- \*4: Design circuits so that (|VH|-|VI|) is always less than 40V when switching the power supply with the load connected.
- \*5: Set up the VL power supply with an offset voltage at power supply switching (VL-VO) of about 8V as an initial target.
- \*6: Please connect –Pre V<sub>CC</sub> pin (#5 pin) with the stable minimum voltage and connect so that current does not flow in by reverse bias.
- \*7: Use the standby pin (pin 17) so that the applied voltage never exceeds the maximum rating. The power amplifier is turned on by applying +2.5V to +5.5V to the standby pin (pin 17).
- \*8: Thermal design must be implemented based on the conditions under which the customer's end products are expected to operate on the market.
- \*9: A thermoplastic adhesive resin is used for this hybrid IC.



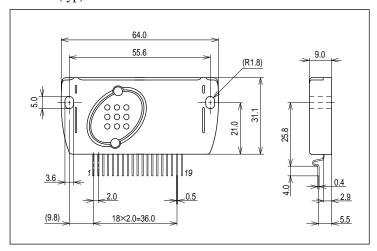
Designated transformer power supply (MG-250 equivalent)



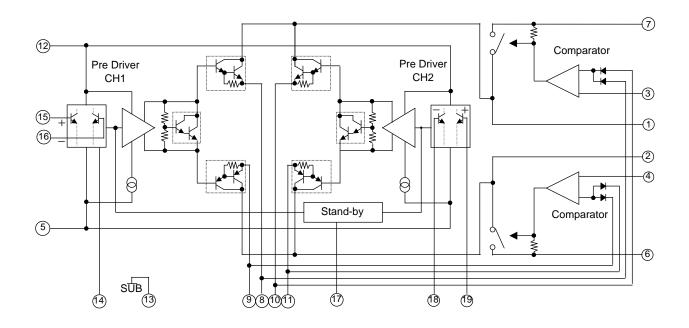
Designated transformer power supply (MG-200 equivalent)

## **Package Dimensions**

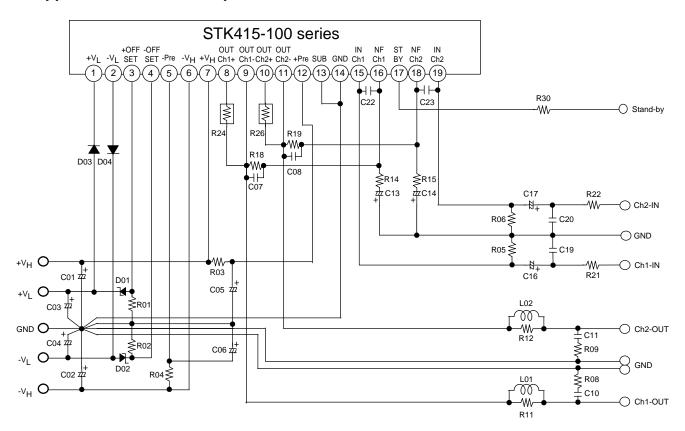
unit:mm (typ)



## **Internal Equivalent Circuit**



## **Application Circuit Example**

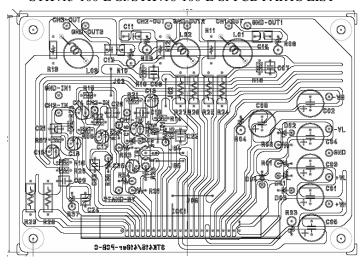


## **Recommended Values for Application Parts (for the test circuit)**

	Recommended		Larger than Recommended	Smaller than
Symbol	Value	Description	Value	Recommended Value
R01, R02	1.5kΩ	Determine the current flowing into the power switching	Power holding circuit	Power switching circuit
- , -	-	circuit (comparator), (3mA to 10mA at V <sub>H</sub> power	remains active at lower	activates at higher
		switching)	frequencies.	frequencies.
R03, R04	100Ω/1W	Ripple filtering resistors	Decreased pass-through	Increased pass-through
,		(Used with C05 and C06 to form a ripple filter.)	current at high frequencies.	current at high frequencies.
R05, R06	56kΩ	Input bias resistors	VN offset	J - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
,		(Virtually determine the input impedance.)	(Ensure R05=R18, R06=R19	when changing.)
R08, R09	4.7Ω/1W	Oscillation prevention resistor	-	-
R11, R12	4.7Ω	Oscillation prevention resistor	-	-
R14,R15	560Ω	Used with R18 and R19 to determine the voltage gain	Likely to oscillate	None
1(14,1(13	30032	VG. (VG should desirably be determined by the R14 and R15 value.)	(VG<40dB)	None
R18, R19	56kΩ	Used with R14 and R15 to determine the voltage gain VG.	-	-
R21, R22	1kΩ	Input filtering resistor	-	-
R24, R26	0.22Ω±10%,	Output emitter resistors	Decrease in maximum	Likely to cause thermal-
	5W	(Use of cement resistor is desirable)	output power	runaway.
R30	Remarks *7	Use a limiting resistor according to the voltage applied to	the standby pin so that it remain	ns within the rating.
C01, C02	100μF/	Oscillation prevention capacitors.		
	100V	Insert the capacitors as close to the IC as possible to		
		decrease the power impedance for reliable IC	-	-
		operation (use of electrolytic capacitors are		
		desirable).		
C03, C04	100μF/	Oscillation prevention capacitors.		
	50V	Insert the capacitors as close to the IC as possible to		
		decrease the power impedance for reliable IC	-	-
		operation (use of electrolytic capacitors are		
		desirable).		
C05, C06	100μF/	Decoupling capacitors.		s that pass into the input side
	100V	Eliminate ripple components that pass into the input	from the power line.	
		side from the power line.		
		(Used with R03 and R04 to form a ripple filter.)		
C07, C08	3pF	Oscillation prevention capacitor	Likely to oscillate	
C10, C11	0.1μF	Oscillation prevention capacitor	Likely to oscillate	
C12 C14	22	(Mylar capacitors are recommended.)	Ingrange in low frequency	Dograda in law fraguency
C13, C14	22μF/	NF capacitor	Increase in low-frequency	Decrease in low-frequency
	10V	(Changes the low cutoff frequency;	voltage gain, with higher	voltage gain
		ex/f <sub>L</sub> =1/2π •C13•R14)	pop noise at power-on.	
C16, C17	2.2μF/	Input coupling capacitor (block DC current)	-	-
040, 000	50V	land the second		
C19, C20	470pF	Input filter capacitor		
		(Used with R21 and R22 to form a filter that suppresses	-	-
C22 C22	100~5	high-frequency noises.)	Likely to engillate	
C22, C23	100pF	Oscillation prevention capacitor	Likely to oscillate.	
D01, D02	18V	Determine the offset voltage at V <sub>L</sub> ↔V <sub>H</sub> power.	Decreased distortion at power switching time	Increased distortion at power switching time.
D03, D04	3A/60V	Reverse current prevention diodes	,	,
200, 204	3, 0 00 V	(FRD is recommended.)	-	-
L01, L02	3μН	Oscillation prevention inductance	None	Likely to oscillate.
•		'	l .	<u> </u>

## **Sample PCB Trace Pattern**

STK415-100-E-Sr/STK416-100-E-Sr PCB PARTS LIST



## **Parts List**

STK415, 416-100Sr PCB Parts List

PCB No.		PARTS	RATING	STK415 (416) -090-E, -100-E, -120-E, 130-E	STK415-140-E		
R01, R02		-	ERX1SJ***	1.5kΩ, 1W	1.5kΩ, 1W		
R03, R04		100Ω, 1W	ERG1SJ101	enabled	enabled		
R05, R06, (R07), R18, R19, (R20)		56kΩ, 1/6W	RN16S563FK	enabled	enabled		
R08, R09, (R10)		4.7Ω, 1W	ERX1SJ4R7	enabled	enabled		
R11, R12, (R13)		4.7Ω, 1/4W	RN14S4R7FK	enabled	enabled		
R14, R15, (F	R16)	-	RN16S***FK	560Ω, 1/6W	560Ω, 1/6W		
R21, R22, (F	R23)	1kΩ, 1/6W	RN16S102FK	enabled	enabled		
R25, R27, (F	R29)	0.22Ω±10%, 5W	BPR56CFR22J	Short	Short		
R24, R26, (F	R28)	0.22Ω±10%, 5W	BPR56CFR22J	enabled	enabled		
R35, R36, R	37	-	-	Short	Short		
C01, C02, C05, C06		100μF, 100V	100MV100HC	enabled	enabled		
C03, C04		100μF, 50V	50MV100HC	enabled	enabled		
C07, C08, (C09)		3pF	DD104-63B3ROK50	enabled	enabled		
C10, C11, (C12)		0.1μF, 100V	ECQ-V1H104JZ	enabled	enabled		
C13, C14, (C15)		22μF, 10V	10MV220HC	enabled	enabled		
C16, C17, (C18)		2.2μF, 50V	50MV2R2HC	enabled	enabled		
C19, C20, (C	221)	470pF	DD104-63B471K50	enabled	enabled		
C22, C23, (C	224)	100pF	DD104-63B101K50	enabled	enabled		
D01, D02		-	-	GZA15X (SANYO)	GZA18X (SANYO)		
D03, D04		IF (AV)=3A/60V		enabled	enabled		
L01, L02, (L0	03)	3μΗ		enabled	enabled		
Stand-By	R30	3.3kΩ,1/6W	RN16S332FK	enabled	enabled		
	R32	1kΩ,1/6W	RN16S102FK	enabled	enabled		
	R33	33kΩ,1/6W	RN16S333FK	enabled	enabled		
	R34	2kΩ,1/6W	RN16S202FK	enabled	enabled		
	C25	47μF,10V	10MV47HC	enabled	enabled		
C25 D05 TR1		-	GMB01 (Ref.)	enabled	enabled		
		-	2SC2274 (Ref.)	enabled	enabled		
J01	·	Jumper	20mm	enabled	enabled		
J02, J03, J06	6	Jumper	10mm	enabled	enabled		
J04, J05		Jumper	7mm	enabled	enabled		

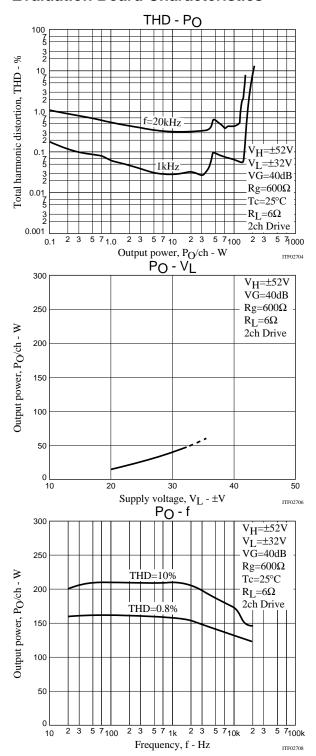
(\*1) STK416-100Sr (3ch AMP) doesn't mount parts of ().

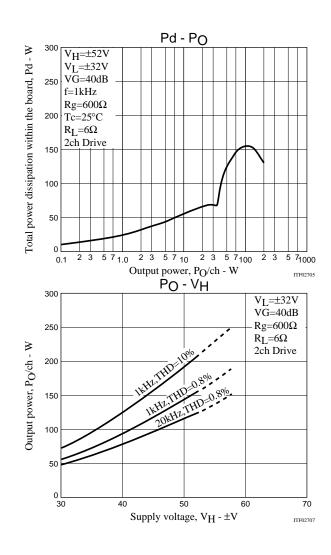
## Pin Assignments

[STK433-000/-100/-200 Sr & STK415/416-100 Sr Pin Layout]

[STK433-000/-100/-200 Sr & S	) I K <sup>2</sup>	+13/	410	-100	) Sr	Pin	Lay	out <sub>.</sub>															
2ch class-AB					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
ZCIT Class-AB										2ch	clas	sAB/	2.00r	nm									
STK433-030-E 30W/JEITA					-	-	+	0	0	0	0	+			I	N	S	N	I				
STK433-040-E 40W/JEITA					Р	٧	٧	U	U	U	U	Р	S	G	N	F	Т	F	Ν				
STK433-060-E 50W/JEITA					R	С	С	Т	Т	Т	Т	R	U	N	/	/	Α	/	/				
STK433-070-E 60W/JEITA					Е	С	С	/	/	/	/	Е	В	D	С	С	Ν	С	С				
								С	С	С	С		•		Н	Н	D	Н	Н				
STK433-090-E 80W/JEITA								Н	Н	Н	Н		G		1	1		2	2				
STK433-100-E 100W/JEITA								1	1	2	2		N				В						
STK433-120-E 120W/JEITA								+	-	+	-		D				Υ						
STK433-130-E 150W/JEITA																							
0.1.145					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
3ch class-AB						•				3ch	clas	sAB/	2.00n	nm									
STK433-230A-E 30W/JEITA	1				-	-	+	0	0	0	0	+			1	Ν	S	Ν	1	Ι	Ν	0	0
STK433-240A-E 40W/JEITA					Р	٧	٧	U	U	U	U	Р	S	G	N	F	Т	F	Ν	N	F	U	U
STK433-260A-E 50W/JEITA					R	С	С	Т	Т	Т	Т	R	U	N	/	/	Α	/	/	/	/	Т	Т
STK433-270-E 60W/JEITA					Е	С	С	/	/	/	/	Е	В	D	С	С	N	С	С	С	С	/	/
STK433-290-E 80W/JEITA								С	С	С	С		•		Н	Н	D	Н	Н	н	Н	С	С
STK433-300-E 100W/JEITA								Н	Н	Н	Н		G		1	1	1	2	2	3	3	Н	Н
STK433-320-E 120W/JEITA								1	1	2	2		N				В					3	3
STK433-330-E 150W/JEITA								+	-	+	-		D				Υ					+	-
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19				
2ch class-H		2ch classH/2.00mm																					
STK415-090-E 80W/JEITA	+	-	+	-	-	-	+	0	0	0	0	+			I	N	S	N	Ι				
STK415-100-E 90W/JEITA	V	V	0	0	Р	٧	٧	U	U	U	U	Р	S	G	N	F	Т	F	Ν				
STK415-120-E 120W/JEITA	L	L	F	F	R	Н	Н	Т	Т	Т	Т	R	U	N	/	/	Α	/	/				
STK415-130-E 150W/JEITA			F	F	Е			/	/	/	/	Е	В	D	С	С	N	С	С				
STK415-140-E 180W/JEITA			S	s				С	С	С	С		•		Н	Н	D	Н	Н				
			Е	Е				Н	Н	Н	Н		G		1	1	ı	2	2				
			Т	Т				1	1	2	2		N				В						
								+	-	+	-		D				Υ						
0.1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
3ch class-H				•						3с	h clas	ssH/2	2.00m	ım									
STK416-090-E 80W/JEITA	+	-	+	-	-	-	+	0	0	0	0	+			I	N	S	N	1	1	N	0	0
STK416-100-E 90W/JEITA	V	٧	0	0	Р	٧	٧	U	U	U	U	Р	S	G	N	F	Т	F	Ν	Ν	F	U	U
STK416-120-E 120W/JEITA	L	L	F	F	R	Н	Н	Т	Т	Т	Т	R	U	Ν	/	/	Α	/	/	/	/	Т	Т
STK416-130-E 150W/JEITA			F	F	Е			/	/	/	/	Ε	В	D	С	С	Ν	С	С	С	С	/	/
			S	S				С	С	С	С		•		Н	Н	D	Н	Н	Н	Н	С	С
			Е	Е				Н	Н	Н	Н		G		1	1		2	2	3	3	Н	Н
			Т	Т				1	1	2	2		N				В					3	3
								+		+	_		D				Υ					+	

## **Evaluation Board Characteristics**





[Thermal Design Example for STK415-140-E ( $R_L = 8\Omega$ )]

The thermal resistance,  $\theta$ c-a, of the heat sink for total power dissipation, Pd, within the hybrid IC is determined as follows

Condition 1: The hybrid IC substrate temperature, Tc, must not exceed 125°C.

$$Pd \times \theta c - a + Ta < 125^{\circ}C \qquad (1)$$

Ta: Guaranteed ambient temperature for the end product

Condition 2: The junction temperature, Tj, of each power transistor must not exceed 150°C.

$$Pd \times \theta c-a + Pd/N \times \theta j-c + Ta < 150^{\circ}C \qquad (2)$$

N: Number of power transistors

 $\theta$ i-c: Thermal resistance per power transistor

However, the power dissipation, Pd, for the power transistors shall be allocated equally among the number of power transistors.

The following inequalities result from solving equations (1) and (2) for  $\theta c$ -a.

$$\theta c-a < (125 - Ta)/Pd$$
 ..... (1)'  $\theta c-a < (150 - Ta)/Pd - \theta j-c/N$  .... (2)'

Values that satisfy these two inequalities at the same time represent the required heat sink thermal resistance.

When the following specifications have been stipulated, the required heat sink thermal resistance can be determined from formulas (1)' and (2)'.

Supply voltage
 Load resistance
 Guaranteed ambient temperature
 Ta

#### [Example]

When the IC supply voltage,  $V_H$ =±52V,  $V_L$ =±32V and  $R_L$  is  $6\Omega$ , the total power dissipation, Pd, within the hybrid IC, will be a maximum of 156W at 1kHz for a continuous sine wave signal according to the Pd-PO characteristics. For the music signals normally handled by audio amplifiers, a value of 1/8PO max is generally used for Pd as an estimate of the power dissipation based on the type of continuous signal. (Note that the factor used may differ depending on the safety standard used.)

This is:

Pd 
$$\approx 63.0$$
W (when 1/8PO max. = 15W, PO max. = 120W).

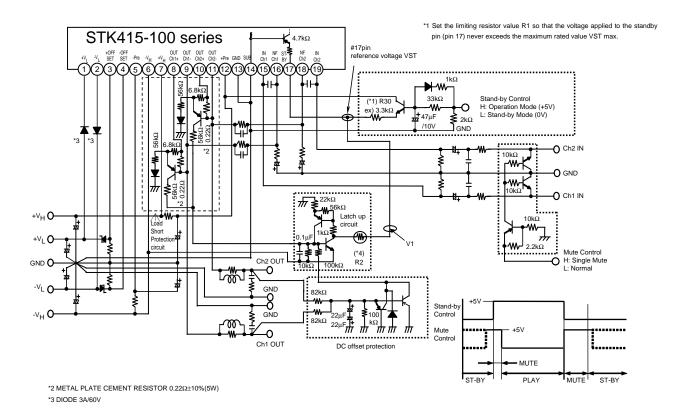
The number of power transistors in audio amplifier block of these hybrid ICs, N, is 4, and the thermal resistance per transistor,  $\theta$ j-c, is 1.5°C/W. Therefore, the required heat sink thermal resistance for a guaranteed ambient temperature, Ta, of 50°C will be as follows.

From formula (1)' 
$$\theta c\text{-a} < (125-50)/63.0 \\ < 1.19$$
 From formula (2)' 
$$\theta c\text{-a} < (150-50)/63.0 - 1.5/4 \\ < 1.21$$

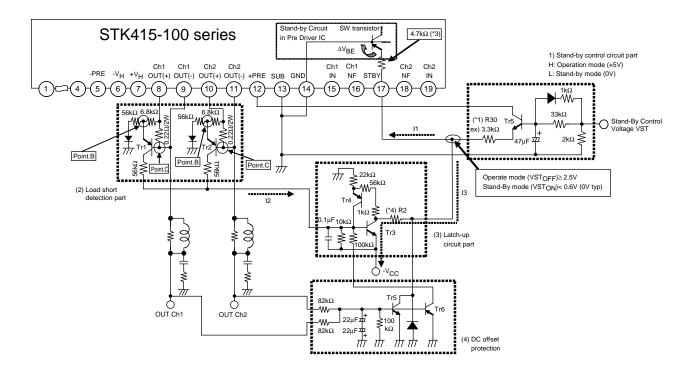
Therefore, the value of 1.19°C/W, which satisfies both of these formulae, is the required thermal resistance of the heat sink.

Note that this thermal design example assumes the use of a constant-voltage power supply, and is therefore not a verified design for any particular user's end product.

## STK415-100 Series Stand-by control, Mute control, Load-short protection & DC offset protection application



## STK415-100 Series Application explanation



The protection circuit application for the STK415-100sr consists of the following blocks (blocks (1) to (4)).

- (1) Standby control circuit block
- (2) Load short-circuit detection block
- (3) Latch-up circuit block
- (4) DC voltage protection block

#### 1) Standby control circuit block

Concerning pin 17 reference voltage VST

#### <1> Operation mode

The switching transistor of the predriver IC turns on when the pin 17 reference voltage, VST, becomes greater than or equal to 2.5V, placing the amplifier into the operation mode.

Example: When VST (min.) = 2.5V

I1 is approximately equal to 0.40mA since VST = (\*2) × IST + 0.6V  $\rightarrow$  2.5V = 4.7k $\Omega$  × IST + 0.6V.

## <2> Standby mode

The switching transistor of the predriver IC turns off when the pin 17 reference voltage, VST, becomes lower than or equal to 0.6V (typ. 0V), placing the amplifier into the standby mode.

Example: When VST = 0.6V

I1 is approximately equal to 0mA since VST = (\*2) × IST + 0.6V  $\rightarrow$  0.6V = 4.7k $\Omega$  × IST + 0.6V.

#### (\*1) Limiting resistor

Determine the value of R1 so that the voltage VST applied to the standby pin (pin 17) falls within the rating (+2.5V to 5.5V (typ. 3.0V)).

- (\*2) The standby control voltage must be supplied from the host including microcontrollers.
- (\*3) A  $4.7k\Omega$  limiting resistor is also incorporated inside the hybrid IC (at pin 17).

#### 2) Load short-circuit detection block

Since the voltage between point B and point C is less than 0.6V in normal operation mode ( $V_{BE} < 0.6V$ ) and TR1 (or TR2) is not activated, the load short-circuit detection block does not operate.

When a load short-circuit occurs, however, the voltage between point B and point C becomes larger than 0.6V, causing TR1 (or TR2) to turn on  $(V_{BE} > 0.6V)$ , and current I2 to flows.

#### 3) Latch-up circuit block

TR3 is activated when I2 is supplied to the latch-up circuit.

When TR3 turns on and current I3 starts flowing, VST goes down to 0V (standby mode), protecting the power amplifier.

Since TR3 and TR4 configure a thyristor, once TR3 is activated, the IC is held in the standby mode.

To release the standby mode and reactivate the power amplifier, it is necessary to set the standby control voltage (\*2) temporarily low (0V). Subsequently, when the standby control is returned to high, the power amplifier will become active again.

(\*4) The I3 value varies depending on the supply voltage. Determine the value of R2 using the formula below, so that I1 is equal to or less than I3.

 $I1 \le I3 = V_{CC}/R2$ 

## 4) DC offset protection block

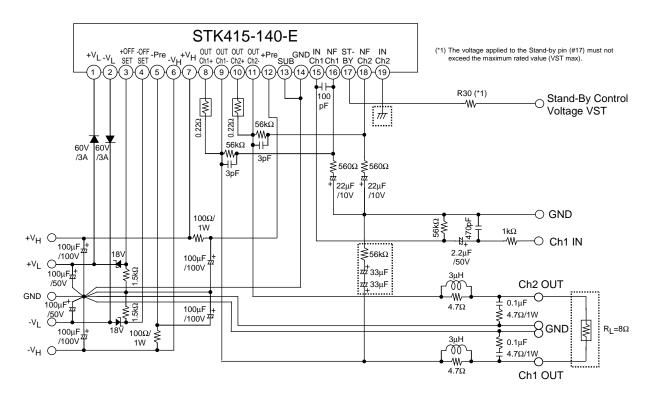
The DC offset protection circuit is activated when  $\pm 0.5$ V (typ) voltage is applied to either "OUT CH1" or "OUT CH2," and the hybrid IC is shut down (standby mode).

To release the IC from the standby mode and reactivate the power amplifier, it is necessary to set the standby control voltage temporarily low (0V).

Subsequently, when the standby control is returned to high (+5V), for example, the power amplifier will become active again.

The protection level must be set using the  $82k\Omega$  resistor. Furthermore, the time constant must be determined using  $22\mu//22\mu$  capacitors to prevent the amplifier from malfunctioning due to the audio signal.

## STK415-140-E BTL Application



- SANYO Semiconductor Co.,Ltd. assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO Semiconductor Co.,Ltd. products described or contained herein.
- SANYO Semiconductor Co.,Ltd. strives to supply high-quality high-reliability products, however, any and all semiconductor products fail or malfunction with some probability. It is possible that these probabilistic failures or malfunction could give rise to accidents or events that could endanger human lives, trouble that could give rise to smoke or fire, or accidents that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO Semiconductor Co.,Ltd. products described or contained herein are controlled under any of applicable local export control laws and regulations, such products may require the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written consent of SANYO Semiconductor Co.,Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO Semiconductor Co.,Ltd. product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production.
- Upon using the technical information or products described herein, neither warranty nor license shall be granted with regard to intellectual property rights or any other rights of SANYO Semiconductor Co.,Ltd. or any third party. SANYO Semiconductor Co.,Ltd. shall not be liable for any claim or suits with regard to a third party's intellectual property rights which has resulted from the use of the technical information and products mentioned above.

This catalog provides information as of July 2009. Specifications and information herein are subject to change without notice.