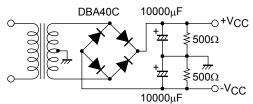
Operating Characteristics at Tc = 25°C, $R_L = 6\Omega$ (Non-inductive Load), $Rg = 600\Omega$, VG = 30dB

<u> </u>			, ,				<i>"</i>	,				
				С	onditions							
Parameter		Symbol	V _{CC}	f [Hz]	P _O [W]	THD [%]		min	typ	max	Unit	
Output power	*1	P _O 1	±27	20 to 20k		0.4		33	35			
		P _O 2	±27	1k		10			50		W	
		P _O 3	±22	1k		1	R _L =4Ω		35			
Total harmonic distortion	*1	THD 1	±27	20 to 20k	- 0		\(\(\text{O} \) = 0.0 \(\text{ID} \)			0.4	0/	
		THD 2	±27	1k	5.0		VG=30dB		0.02		%	
Frequency characteristics	*1	f _L , f _H	±27		1.0		+0 -3dB		20 to 50k		Hz	
Input impedance		ri	±27	1k	1.0				55		kΩ	
Output noise voltage	*3	V _{NO}	±33				Rg=2.2kΩ			1.0	mVrms	
Quiescent current		Icco	±33				No load	15	30	70	mA	
Quiescent current at stand-	by	ICST	±33				VST=0V			1.0	mA	
Output neutral voltage		V_N	±33					-70	0	+70	mV	
#13 Stand-by ON threshold	l *5	VST ON	±27				Stand-by		0	0.6	V	
#13 Stand-by OFF threshol	d *5	VST OFF	±27				Operation	2.5	3.0	5.5	V	

Note

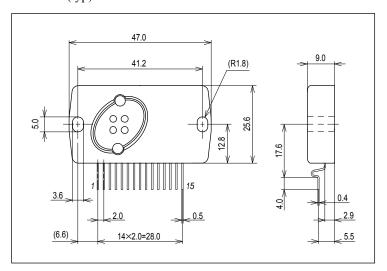
- *1. 1channel operation.
- *2. All tests are measured using a constant-voltage supply unless otherwise specified
- *3. The output noise voltage is peak value of an average-reading meter with a rms value scale (VTVM). A regulated AC supply (50Hz) should be used to eliminate the effects of AC primary line flicker noise
- *4. Allowable time for load short-circuit and output noise voltage are measured using the specified transformer power supply.
- *5. The impression voltage of '#13 (Stand-By) pin' must not exceed the maximum rating. Power amplifier operate by impressing voltage +2.5 to +5.5V to '#13 (Stand-By) pin'.
- * Please connect PreV_{CC} pin (#1 pin) with the stable minimum voltage. and connect so that current does not flow in by reverse bias.
- * In case of heat sink design, we request customer to design in the condition to have assumed market.
- * The case of this Hybrid-IC is using thermosetting silicon adhesive (TSE322SX).
- * Weight of HIC : (typ) 12.0g Outer carton dimensions (W×L×H) : 452mm×325mm×192mm

Specified transformer power supply (Equivalent to MG-200)



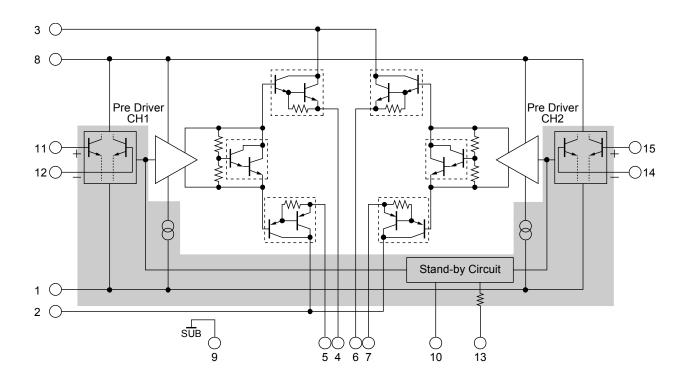
Package Dimensions

unit: mm (typ)

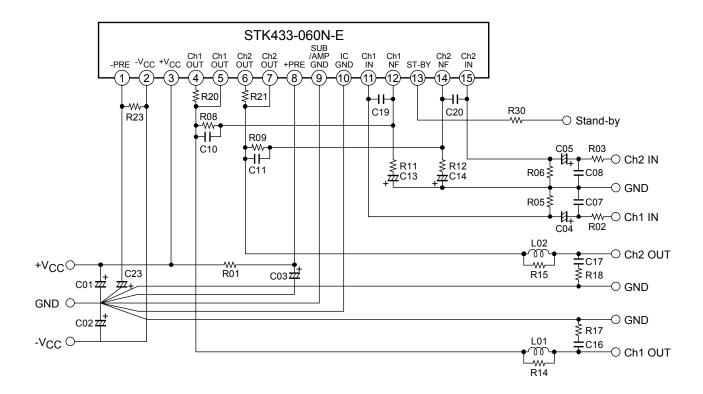


RoHS directive pass

Equivalent Circuit

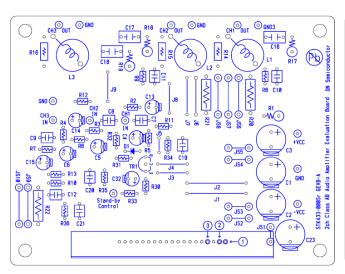


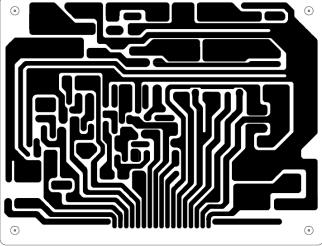
Application Circuit



PCB Layout Example

Top view





STK433-040N-E/060N-E/130N-E/330N-E PCB PARTS LIST

PCB Name: STK433 - 000Sr GEVB - A

Locat	ion No.									
	doesn't mount of ().	RATING		Component						
			STK433-							
Hybrid IC#1 Pin Posit	ion	-	040N-E	060N-E	130N-E/ 330N-E					
R01		100Ω, 1W		0						
R02, R03, (R04)		1kΩ, 1/6W		0						
R05, R06, (R07), R08	3, R09, (R10)	56KΩ, 1/6W		0						
R11, R12, (R13)		1.8KΩ, 1/6W		0						
R14, R15, (R16)		4.7Ω, 1/4W		0						
R17, R18, (R19)		4.7Ω, 1W		0						
R20, R21, (R22)		0.22Ω, 2W	0	0	-					
		0.22Ω, 5W	-	-	0					
C01, C02, C03, C23		100μF, 100V	0							
C04, C05, (C06)		2.2μF, 50V								
C07, C08, (C09)		470pF, 50V		0						
C10, C11, (C12)		3pF, 50V								
C13, C14, (C15)		10μF, 16V								
C16, C17, (C18)		0.1μF, 50V								
C19, C20, (C21)		***pF, 50V	100pF 56pF I							
R34, R35, (R36)		Jumper	Short							
L01, L02, (L03)		3μΗ	0							
	Tr1	VCE ≥ 75V, IC ≥ 1mA								
	D1	Di	•							
Stand-By	R30 (*2)	2.7kΩ, 1/6W	∘ (*2)							
Control	R31	33kΩ, 1/6W	0							
Circuit	R32	1kΩ, 1/6W		0						
	R33	2kΩ, 1/6W		0						
	C32	33μF, 10V		0						
J1, J2, J3, J4, J5, J6,	J8, J9	Jumper								
J7, JS2, JS3, JS4, JS JS8, JS9	65, JS7	-	-							
JS6, JS10		Jumper	0							
JS1 (R23)		100Ω, 1W	0							

^(*1) STK433-040N-E/060N-E/130N-E (2ch Amp) doesn't mount parts of ()

^(*2) Recommended standby circuit is used.

Recommended external components

STK433-040N-E/060N-E/130N-E/330N-E

Parts	Recommended	Circuit purpose	Above	Below			
Location	value		Recommended value	Recommended value			
R01, R23	100Ω/1W	Resistance for Ripple filter. (Fuse resistance is recommended.	Short-through current	Short-through current			
		Ripple filter is constituted with C03, C23.)	may decrease at	may increase at high			
D00 D00 D04	41.0	Designation of the land of the second of the	high frequency.	frequency.			
R02, R03, R04	1kΩ	Resistance for input filters.	-	=			
R05, R06, R07	56kΩ	Input impedance is determined.	Output neutral voltage(\) (It is referred that R05=				
R08, R09, R10	56kΩ	Voltage Gain (VG) is determined with R11, R12, R13	-	-			
R11, R12, R13	1.8kΩ	Voltage Gain (VG) is determined with R8, R9, R10	It may oscillate.	With especially no			
		(As for VG, it is desirable to set up by R11, R12, R13)	(Vg < 30dB)	problem			
R14, R15, R16	4.7Ω	Resistance for oscillation prevention.	-	-			
R17, R18, R19	4.7Ω/1W	Resistance for oscillation prevention.	-	-			
R20, R21, R22	0.22Ω/2W	This resistance is used as detection resistance of the protection					
	(040N-E,060N-E)	circuit application.	Decrease of	It may cause thermal runaway			
	0.22Ω/5W		Maximum output				
	(130N-E,330N-E)		Power	,			
R30	Note *5	Select Restriction resistance, for the impression voltage of '#17	(Stand-By) pin' must no	t exceed the maximum			
		rating.					
C01, C02	100μF/50V	Capacitor for oscillation prevention.					
		• Locate near the HIC as much as possible.					
		• Power supply impedance is lowered and stable operation of	-	-			
		the IC is carried out. (Electrolytic capacitor is recommended.)					
C03, C23	100μF/50V	Decoupling capacitor	The change in the Ripp	le ingredient mixed in			
		The Ripple ingredient mixed in an input side Is removed from a	an input side from a por	wer supply line			
		power supply line. (Ripple filter is constituted with R01, R23.)					
C04, C05, C06	2.2μF/50V	Input coupling capacitor.(for DC current prevention.)		-			
C07, C08, C09	470pF	Input filter capacitor					
		• A high frequency noise is reduced with the filter constituted by		-			
		R02, R03, R04					
C10, C11, C12	3pF	Capacitor for oscillation prevention.	It may oscillate.				
C13, C14, C15	10μF/10V	Negative feedback capacitor.	The voltage gain (VG)	The voltage gain (VG)			
		The cutoff frequency of a low cycle changes.	of low frequency is	of low frequency			
		$(fL = 1/(2\pi \cdot C13 \cdot R11))$	extended. However,	decreases.			
			the pop noise at the				
			time of a power				
			supply injection also				
			becomes large.				
C16, C17, C18	0.1μF	Capacitor for oscillation prevention.	It may oscillate.				
C19, C20, C21	100pF (040N-E)	Capacitor for oscillation prevention.	It may oscillate.				
	56pF (060N-E)						
	N.C. (130N-E,						
	330N-E)						
L01, L02, L03	3μΗ	Coil for oscillation prevention.	With especially	It may oscillate.			
			no problem				

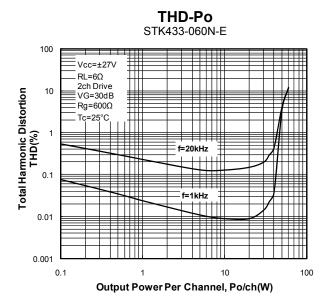
Pin Layout

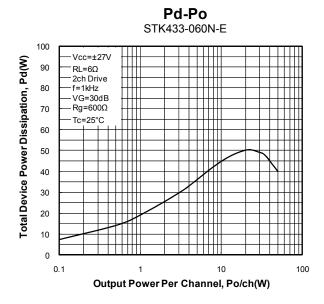
D11X-33 00014/ 10014/ 300	1 101	1 111	Luy	out															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
(Size) 47.0mm×25.6mm×9.0mm						2c	h clas	sAB/	2.00r	nm									
STK433-040N 40W/JEITA	-	-	+	0	0	0	0	+			I	N	S	N	I				
STK433-060N 50W/JEITA	Р	٧	٧	U	U	U	U	Р	S	G	N	F	Т	F	N				
	R	С	С	Т	Т	Т	Т	R	U	N	1	1	Α	1	1				
	E	С	С	/	/	/	/	Е	В	D	С	С	N	С	С				
(Size) 67.0mm×25.6mm×9.0mm				С	C H	С	С				H 1	H 1	D I	H 2	H 2				
STK433-130N 150W/JEITA				1	1	2	2				'	l '	В	_	_				
				+	-	+	-						Y						
	-																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
(Size) 64.0mm×36.6mm×9.0mm					l	3ch classAB/2.00mm										l			
STK433-330N 150W/JEITA	-	-	+	0	0	0	0	+			ı	N	s	N	ı	ı	N	0	0
	Р	٧	٧	U	U	U	U	Р	S	G	N	F	Т	F	N	N	F	U	U
	R	С	С	Т	Т	Т	Т	R	U	Ν	1	1	Α	1	1	1	1	Т	Т
	Е	С	С	1	1	1	1	Е	В	D	С	С	N	С	С	С	С	1	1
	_			С	С	С	С				Н	Н	D	Н	Н	Н	Н	С	С
	_			Н	Н	Н	Н				1	1		2	2	3	3	Н	Н
	_			1	1	2	2						В					3	3
				+	-	+	-						Υ					+	-

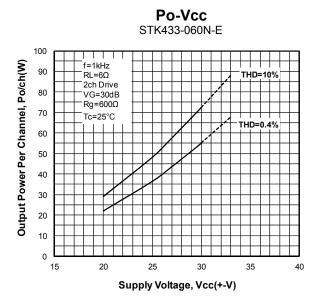
[STK433-000N/-100N/-800Nsr Pin Layout]

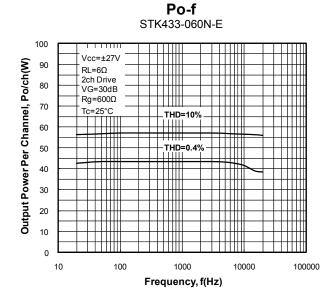
81K433-000IN/-100IN/-800	1421			Outj	1				1		1		1	1	ı	Ì							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15								
(Size) 47.0mm×25.6mm×9.0mm						2c	h clas	sAB/	2.00r	nm													
STK433-040N 40W/JEITA	-	-	+	0	0	0	0	+			1	Ν	S	N	ı								
STK433-060N 50W/JEITA	Р	٧	٧	U	U	U	U	Р	S	G	N	F	Т	F	N								
	R	С	С	Т	Т	T	Т	R	U	N	1	/	Α	1	/								
	Е	С	С	/	/	/	/	Е	В	D	С	С	N	С	С								
(Size) 67.0mm×25.6mm×9.0mm				C H	C H	C H	С				H 1	H 1	D 	H 2	H 2								
STK433-130N 150W/JEITA				1	1	2	2					·	В	_	_								
				+	-	+	-						Υ										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
(Size) 64.0mm×31.1mm×9.0mm					ı				ı	4cl	h clas	sAB/	2.00r	nm	l		ı	l		ı			
STK433-840N 40W/JEITA	-	-	+	0	0	0	0	+			I	N	S	N	ı	Ν	ı	ı	N	0	0	0	0
	Р	٧	٧	U	U	U	U	Р	s	G	N	F	Т	F	N	F	N	N	F	U	U	U	U
	R	С	С	Т	Т	Т	Т	R	U	N	1	1	Α	1	1	1	1	1	1	Т	Т	Т	Т
	Е	С	С	/	1	1	1	Ε	В	D	С	С	N	С	С	С	С	С	С	1	1	/	/
(Size) 78.0mm×44.1mm×9.0mm				С	С	С	С				Н	Н	D	Н	Н	Н	Н	Н	Н	С	С	С	С
` '				H	Н	Н	Н				1	1		2	2	3	3	4	4	Н	Н	Н	Н
STK433-890N 80W/JEITA				1	1	2	2						В							3	3	4	4
				+	-	+	-						Y							-	+	-	+

Characteristic of Evaluation Board









A Thermal Design Tip For STK433-060N-E Amplifier

[Thermal Design Conditions]

The thermal resistance (θ c-a) of the heat-sink which manages the heat dissipation inside the Hybrid IC will be determined as follow:

(Condition 1) The case temperature (Tc) of the Hybrid IC should not exceed 125°C

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

Where Ta: the ambient temperature for the system

(Condition 2) The junction temperature of each power transistor should not exceed 150°C

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

Where N: the number of transistors (two for 1 channel, ten for channel)

 θ_{j-c} : the thermal resistance of each transistor (see specification)

Note that the power consumption of each power transistor is assumed to be equal to the total power dissipation (Pd) divided by the number of transistors (N).

From the formula (1) and (2), we will obtain:

The value which satisfies above formula (1)' and (2)' will be the thermal resistance for a desired heat-sink. Note that all of the component except power transistors employed in the Hybrid IC comply with above conditions.

[Example of Thermal Design]

Generally, the power consumption of actual music signals are being estimated by the continuous signal of $1/8 \text{ P}_{O}$ max. (Note that the value of $1/8 \text{ P}_{O}$ max may be varied from the country to country.) (Sample of STK433-060N-E; $35W \times 2ch$)

If V_{CC} is $\pm 27V$, and R_L is 6Ω , then the total power dissipation (Pd) of inside Hybrid IC is as follow;

$$Pd = 33W$$
 (at 4.375W output power, 1/8 of P_O max)

There are four (4) transistors in Audio Section of this Hybrid IC, and thermal resistance (θ j-c) of each transistor is 3.5°C/W. If the ambient temperature (Ta) is guaranteed for 50°C, then the thermal resistance (θ c-a) of a desired heat-sink should be;

From (1)'
$$\theta c-a < (125 - 50)/33$$

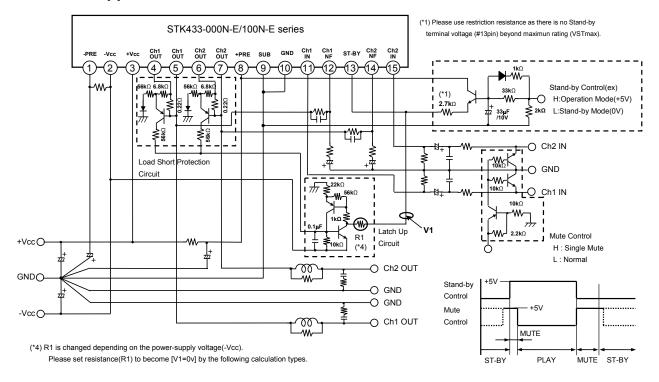
 < 2.27
From (2)' $\theta c-a < (150 - 50)/33 - 3.5/4$
 < 2.16

Therefore, in order to satisfy both (1)' and (2)', the thermal resistance of a desired Heat-sink will be 2.16°C/W.

[Note]

Above are reference only. The samples are operated with a constant power supply. Please verify the conditions when your system is actually implemented.

STK433-000N-E/100N-E series Stand-by Control & Mute Control & Load-Short Protection Application

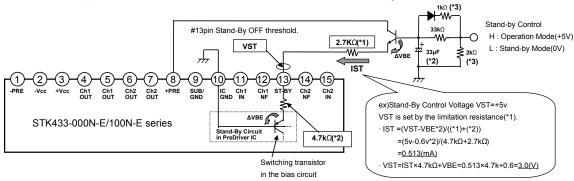


[STK433-000N-E/100N-E series Stand-By Control Example]

[Feature]

- The pop noise which occurs to the time of power supply on/off can be improved substantially by recommendation Stand-By Control Application.
- Stand-By Control can be done by additionally adjusting the limitation resistance to the voltage such as micom, the set design is easy.

(Reference circuit) STK433-000N-E/100N-E series test circuit To Stand-By Control added +5V.



[Operation explanation] #13pin Stand-By Control Voltage VST

(1) Operation Mode

The switching transistor in the bias circuit turns on and places the amplifier into the operating mode, when 13pin (VST) voltage added above 2.5V (typ 3.0V).

(2) Stand-By Mode

When 13pin (VST) voltage is stopped (= 0V), the switching transistor in the bias circuit turn off, placing the amplifier into the standby mode.

- (*1) The current limiting resistor must be used to ensure that stand-by pin (13pin) voltage does not exceed its maximum rated value VST max.
- (*2) The pop noise level when the power is turned on can be reduced by setting the time constant with a capacitor in operating mode.
- (*3) Determines the time constant at which the capacitor (*2) is discharged in stand-by mode.

ORDERING INFORMATION

Device	Package	Shipping (Qty / Packing)
STK433-060N-E	SIP15 (Pb-Free)	25 / Bulk Box

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