



8. Technical Specifications

Parameter	Min	Max	Units	Notes	
Output Voltage	Range	-30	+30	Volts	
	Accuracy	$\pm (1\% + 100\text{mV})$		Volts	
Maximum Offset Voltage	0.1		Volts		
Amplifier Type	Inverting				
Typical Voltage Gain	-3.75				
Gain Variation		5	%		
Input Voltage Range	-10	+10	Volts		
Effective Output Impedance	0.01		Ω	Sensing employed at point of interest	
Average Output Current, I_{MAX}	12.5		Amps	NSG5004A-12	
	25			NSG5004A-25	
Small Signal Bandwidth		18	KHz	NSG5004A-12	
		18		NSG5004A-25	
Full Power Bandwidth		10	KHz	NSG5004A-12	
		8		NSG5004A-25	
Slew Rate, 1K Load, -30V to +30V		4	V/ μ S	NSG5004A-12	
		3		NSG5004A-25	
Peak Output Current, 100mS		60	Amps	NSG5004A-12	
		75		NSG5004A-25	
Rise Time, 10% to 90% NSG5004A-12		25	μ S	1K Ω load, -30V to +30V	
		45		1 Ω load, -15V to +15V	
Fall Time, 90% to 10% NSG5004A-12		25	μ S	1K Ω load, +30V to -30V	
		45		1 Ω load, -15V to +15V	
Rise Time, 10% to 90% NSG5004A-25		25	μ S	1K Ω load, -30V to +30V	
		45		1.2 Ω load, -30V to +30V	
Fall Time, 90% to 10% NSG5004A-25		25	μ S	1K Ω load, +30V to -30V	
		45		1.2 Ω load, -30V to +30V	
Current Limit, I_{Lim}	$0.1I_{MAX}$	I_{MAX}	Amps		
Current Limit Accuracy	$\pm (10\%I_{Lim} + 0.25A)$				
Current Limit Programming Range	1	10	Volts	10V = I_{MAX}	
Output Voltage Limit		± 33	Volts		
Over Temperature shut down	90 $^{\circ}$ C thermal switch				
Input Line Voltage	90	264	Vac	Factory Set	
Input Power, fully loaded		792	Watts	NSG5004A-12	
		1584		NSG5004A-25	
Line frequency	47	63	Hz		
Line Protection	2 x in-line fuse, user accessible			Fuse Value dependent upon line voltage	
Line Regulation		0.1	%		
Load Regulation		0.1	%		
Long term drift		0.1	%		
Temperature Drift		0.02	%/ $^{\circ}$ C		
Output Ripple		3	mVrms		
Voltage DPM Accuracy	$\pm (1\% + 0.1V)$				

Parameter	Min	Max	Units	Notes
Current DPM Accuracy	$\pm (2\% + 0.1A)$			
Height	7		U	1U = 44.45mm
Width	84		HP	1HP = 5.08mm
Depth	511		mm	
Weight		60	Kg	NSG5004A-25
Operating Temperature	5	40	$^{\circ}C$	
Storage Temperature	-10	60	$^{\circ}C$	

Table 8.1 – NSG5004A Technical Specifications

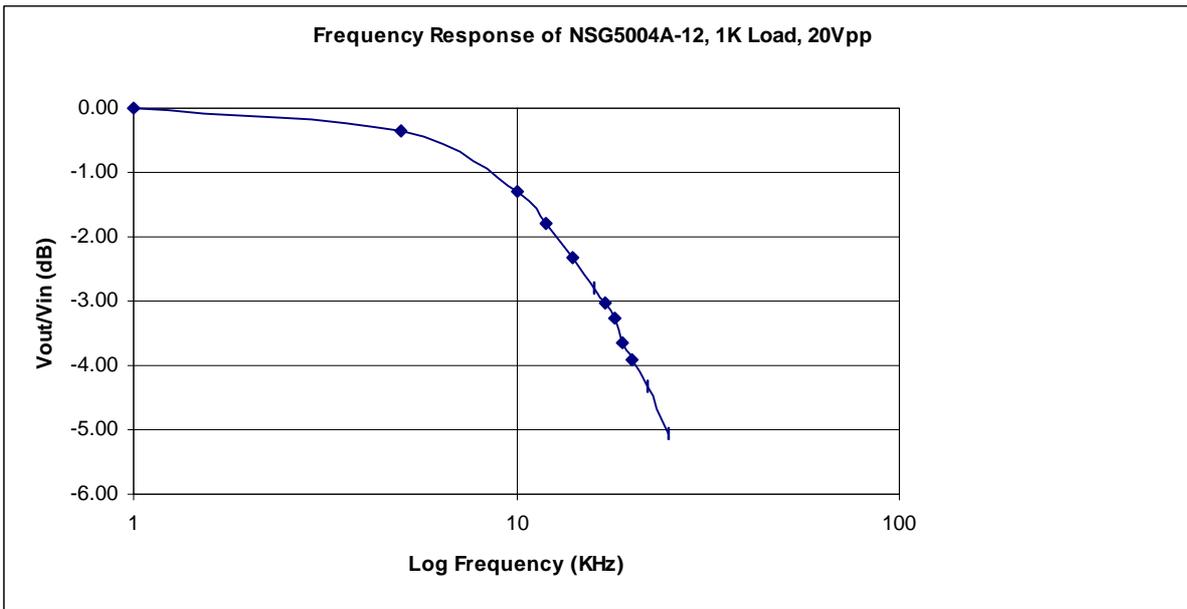


Figure 8.1: Frequency Response of the NSG5004A-12, 1K Load, 20Vpp

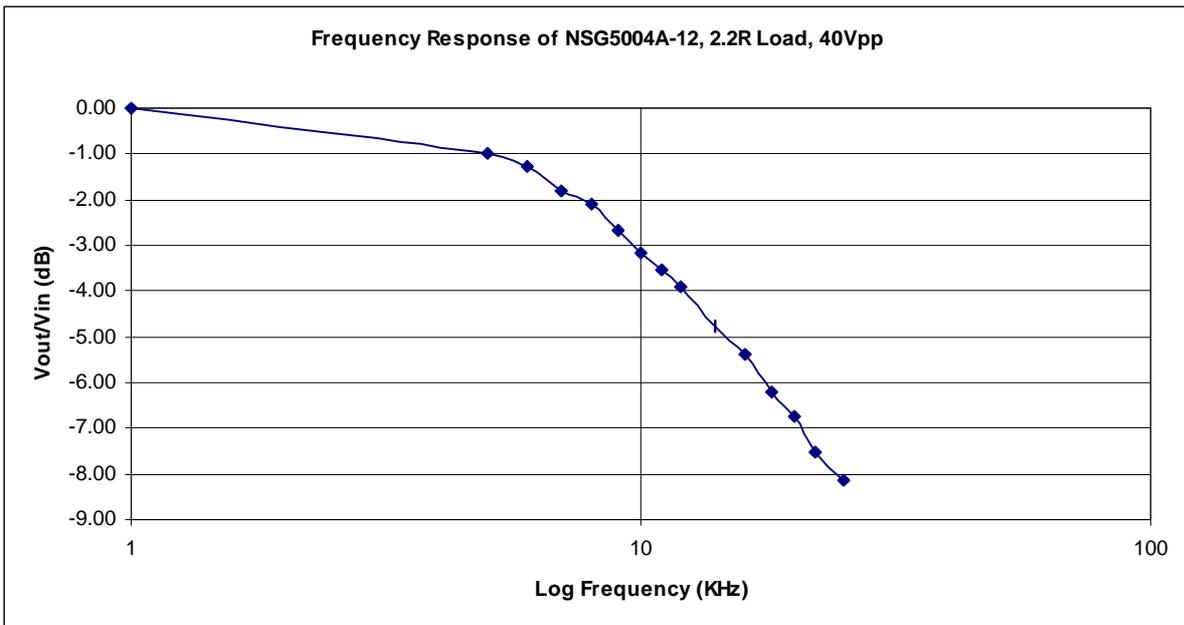


Figure 8.2: Frequency Response of the NSG5004A-12, 2.2W Load, 40Vpp

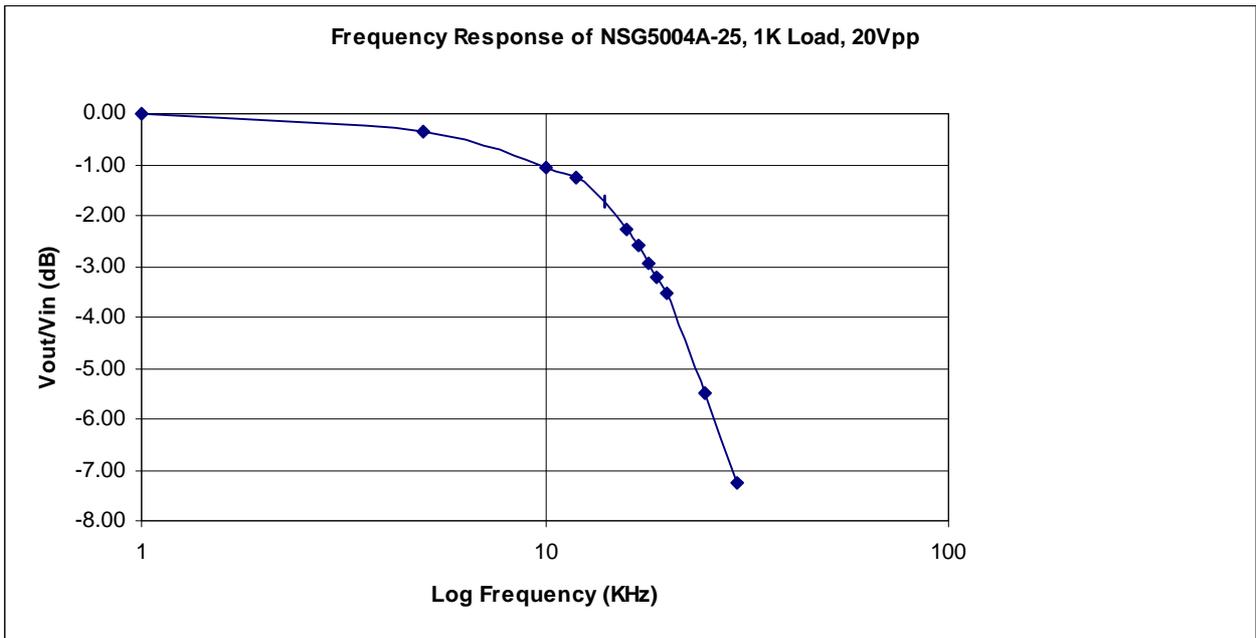


Figure 8.3: Frequency Response of the NSG5004A-25, 1K Load, 20Vpp

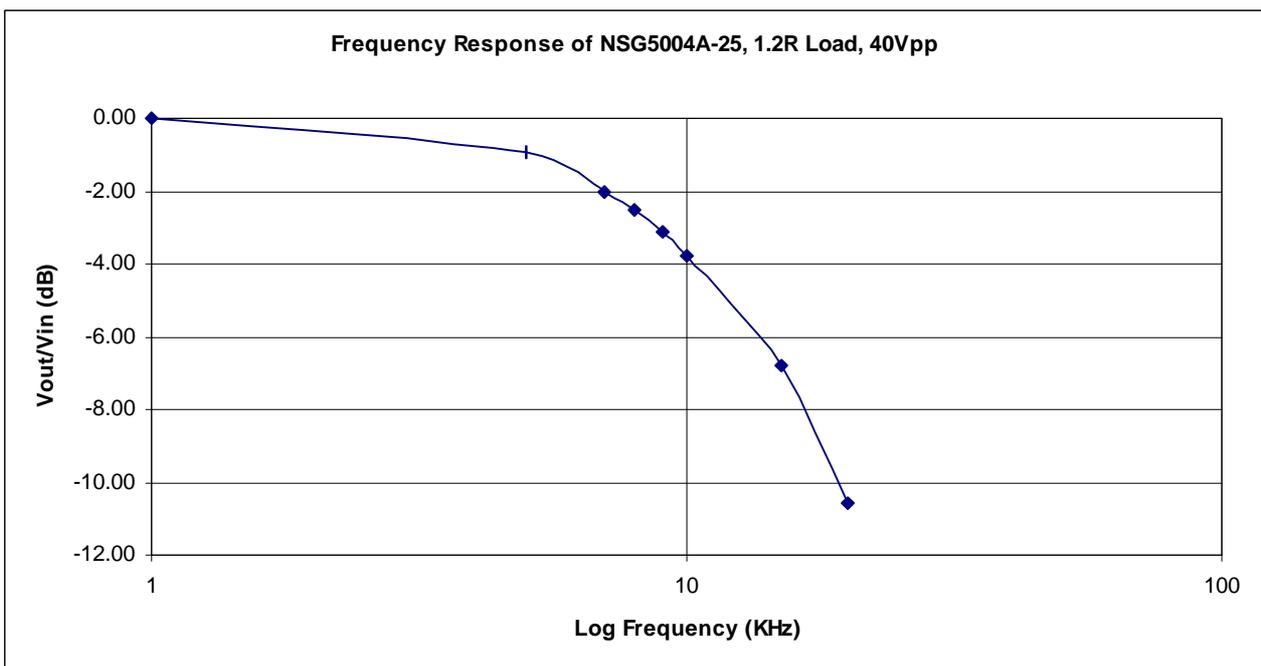


Figure 8.4: Frequency Response of the NSG5004A-25, 1.2W Load, 40Vpp

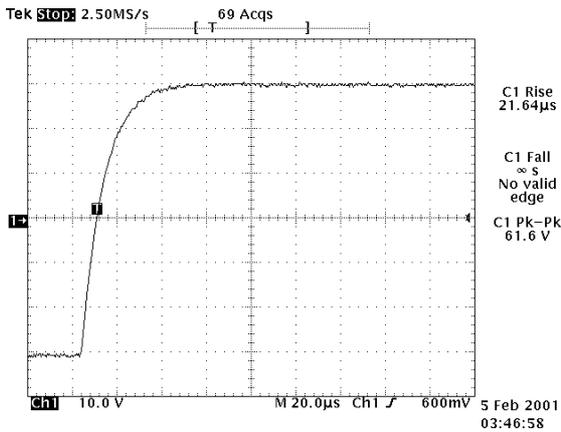


Figure 8.5: NSG5004A-12 Rise Time, 1KW Load, -30V to +30V step

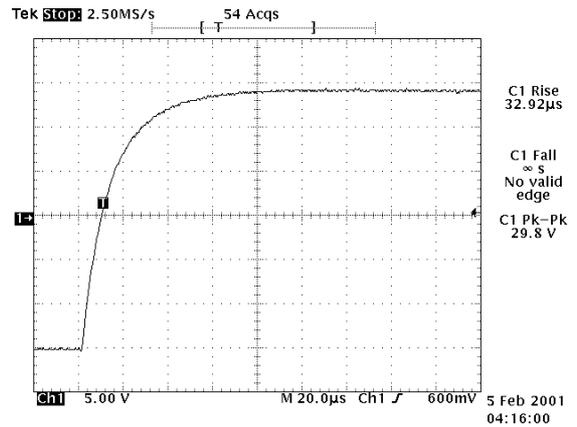


Figure 8.7: NSG5004A-12 Rise Time, 1W Load, -15V to +15V step

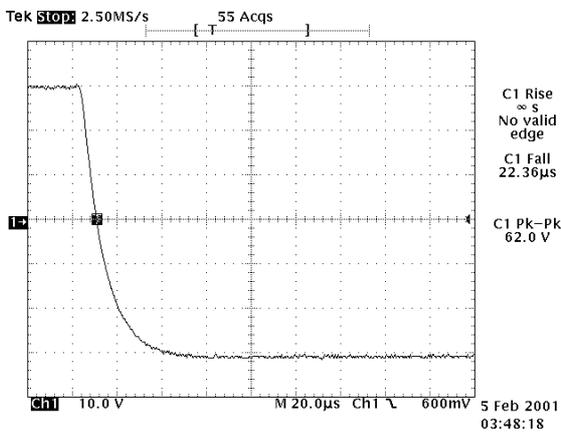


Figure 8.6: NSG5004A-12 Fall Time, 1KW Load, +30V to -30V step

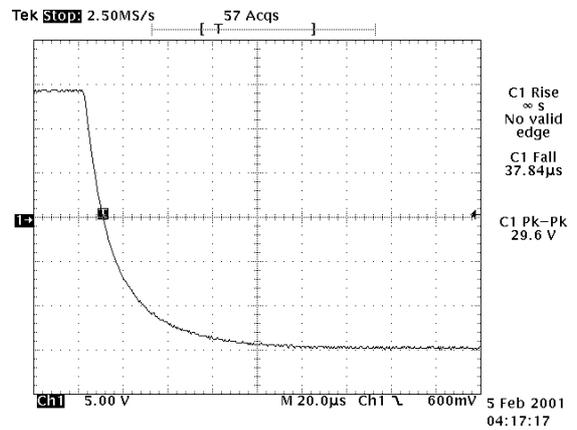


Figure 8.8: NSG5004A-12 Fall Time, 1W Load, -15V to +15V step

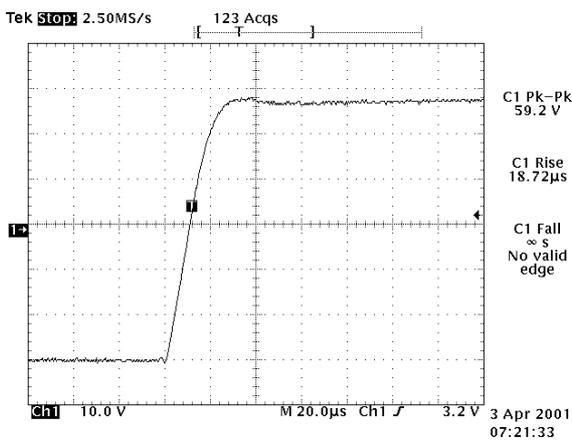


Figure 8.9: NSG5004A-25 Rise Time, 1KW Load, -30V to +30V step

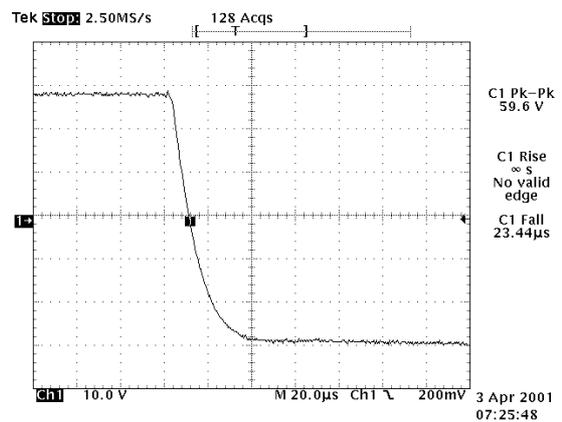


Figure 8.10: NSG5004A-25 Fall Time, 1KW Load, +30V to -30V step

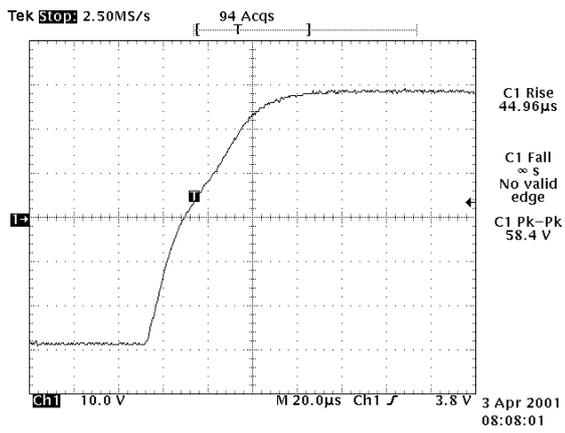


Figure 8.11: NSG5004A-25 Rise Time, 1.2W Load, -30V to +30V step

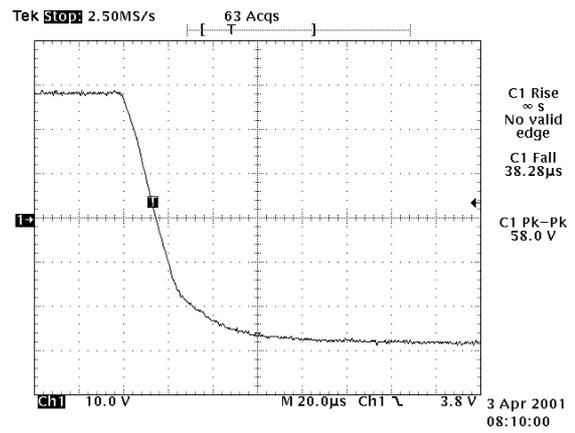


Figure 8.12: NSG5004A-25 Fall Time, 1W Load, -30V to +30V step

9. Applications

9.1 Introduction

The NSG5004A is a programmable bipolar power amplifier, designed generally for use within the automotive test industry. Most automotive standards require a simple DC supply which can be switched ON and OFF during a test. However, there are also numerous requirements to simulate Battery variations.

9.2 Cranking Pulse 4

A typical example of a Battery variation is the so called Cranking pulse, defined as Pulse 4 in ISO 7637. The shape of the Cranking pulse is given in figure 9.1 below.

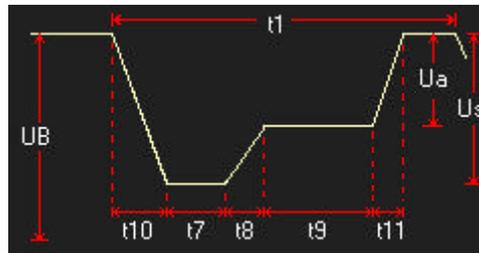


Figure 9.1 – ISO 7637 Cranking Pulse 4

This pulse is generated by driving a signal into the amplifier which is the inverse of the above and is reduced in size by a factor of 1/3.75 or 0.27. The NSG5004A then amplifies and inverts the pulse to in order to reproduce the shape in figure 9.1.

9.3 Pulse 2b

Another pulse that can be reproduced using the NSG5004A is Pulse 2b, as defined ISO 7637-2 and also SAE J1113/11. The shape of Pulse 2b is given in figure 9.2.

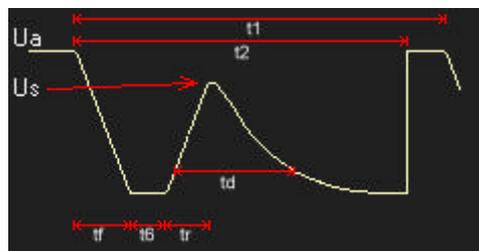


Figure 9.2 – ISO 7637 Pulse 2b

9.3 Pulse 4c Arbitrary Waveforms

Both Pulse 4 and Pulse 2b can be easily re-created using the NSG5004A if driven by the NSG5000 instrument, as these waveforms are industry standard requirements. There are, however, many manufacturer specific requirements required.

Schaffner has developed the NSG 5200 system to cater for the various arbitrary waveform requirements needed by the automotive industry both now and in the future. At the heart of the system is an arbitrary waveform generator card, the output of which drives the NSG5004A. Currently, up to 4 of these cards can be fitted to the NSG 5200 system and synchronised in order to allow multiple arb card waveform generation.

The Arbitrary waveform generator card is capable of generating waveforms that the NSG5004A is not capable of reproducing. This is generally because the power bandwidth of the NSG5004A is too low. However, if the arb card is connected to a faster amplifier (such as the Schaffner AMP 5240) faster waveforms may be possible. The user should consult the Autostar software manual and the NSG5200 hardware manual for more information regarding the use of the arbitrary waveform generator card.

Examples of manufacturer specific requirements are

Daimler Chrysler PF-9326D Section 3.5.7 Supply Voltage Ramp Down

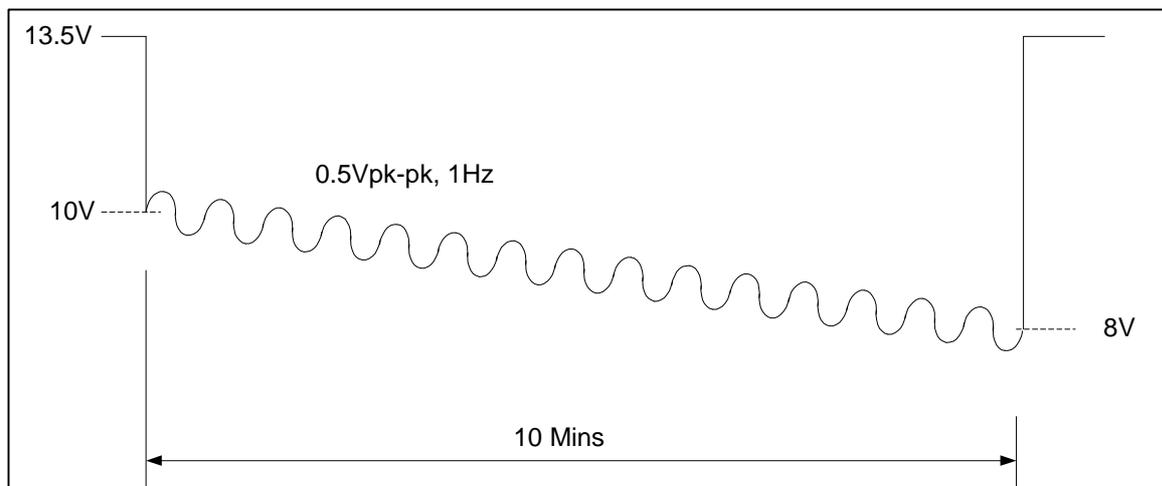
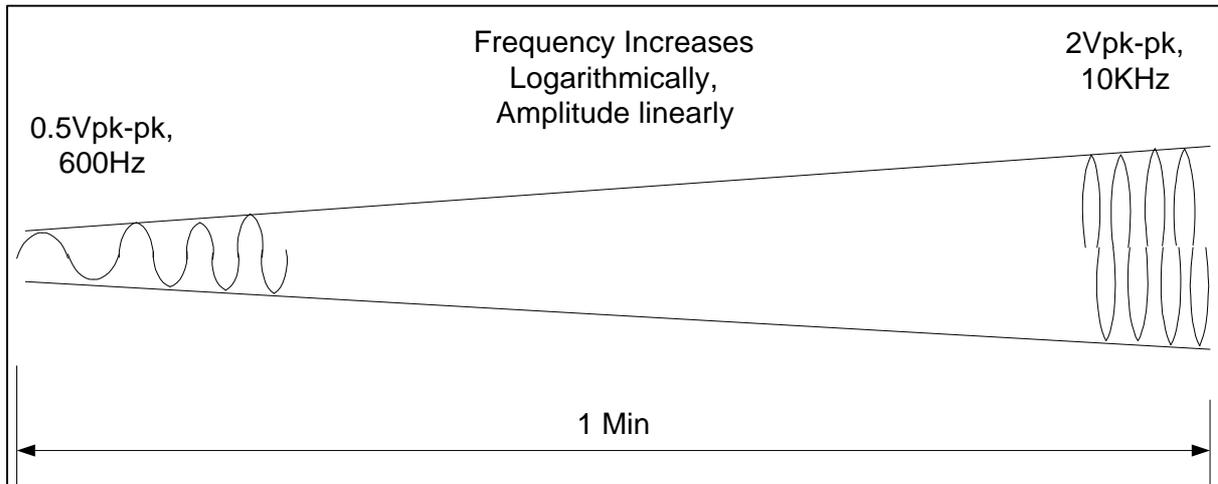


Figure 9.3 – Illustration of Daimler Chrysler PF-9326D 3.5.7 Supply Voltage Ramp Down

Ford ES-XW7T-1A278-AB CI210-A2

*Figure 9.4 – Illustration of Ford ES-XW7T-1A278AB CI210-A2*

9.4 Power Magnetics

The NSG5004A, being a bipolar amplifier, is ideally suited for use in Power Magnetic testing. When used in conjunction with the NSG 5200 system, this amplifier meets many of the required Magnetic Field Susceptibility tests defined within the automotive industry today, such as SAEJ1113/22, GM9123P and the Ford test ES-XW7T-1A278-AB RI 140.

As the bandwidth of the NSG5004A is approximately 22KHz and the Power Magnetic tests generally required signal frequencies from 30Hz to 100KHz, the NSG5004A is used for the low frequency high power field generation while the AMP 5240 is used for the higher frequency, lower power field requirements of the standards. Autostar automatically switches from the external amplifier (NSG5004A) to the the internal amplifier, without any need to change cabling. For more information refer to the Autostar software manual.