



Features

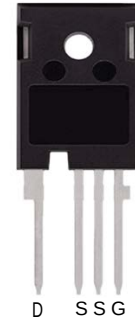
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggednes

Applications

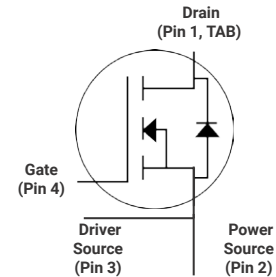
- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC-DC Converters
- Battery Chargers



Ordering Part Number	Package	Brand
NTH4LN040N65S3H	TO-247-4L	HXY MOSFET



TO-247-4L
Package



Maximum Ratings (T_c = 25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V _{DS}	Drain - Source Voltage	650	V	V _{GS} = 0 V, I _D = 100 μA
V _{GSmax}	Gate - Source Voltage (dynamic)	-8/+22	V	AC (f > 1 Hz)
V _{GSop}	Gate - Source Voltage (static)	-4/+18	V	Static
I _D	Continuous Drain Current	49	A	V _{GS} = 18 V, T _C = 25°C
		35		V _{GS} = 18 V, T _C = 100°C
I _{D(pulse)}	Pulsed Drain Current	123	A	Pulse width t _p limited by T _{jmax}
P _{tot}	Power Dissipation	241	W	T _C = 25°C
T _J , T _{stg}	Operating Junction and Storage Temperature	-40 to +175	°C	

•Example of acceptable V_{GS} waveform





Thermal Characteristics

Symbol	Parameter	Value	Unit	Test Conditions
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.62	°C/W	
$R_{\theta JA}$	Thermal Resistance From Junction to Ambient	40		

Electrical Characteristics (Tc = 25°C unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristics						
Drain-source breakdown voltage	BV _{DSS}	650	-	-	V	V _{GS} =0V, I _D =250uA
Gate threshold voltage	V _{GS(th)}	2	-	4	V	V _{DS} =V _{GS} ,I _D =4.8mA
Zero gate voltage drain current	I _{DSS}	- -	1 10	100 -	μA	V _{DS} =650V,V _{GS} =0V T _J =25°C T _J =175°C
Gate-source leakage current	I _{GSS}	-		250	nA	V _{GS} =18V,V _{DS} =0V
Drain-source on-state resistance	R _{DS(on)}	- -	45 55	59 -	mΩ	V _{GS} =18V, I _D =17.6A, T _J =25°C T _J =175°C
Transconductance	g _{fs}	-	6.4	-	S	V _{DS} =20V,I _D =17.6A
Dynamic Characteristics						
Input Capacitance	C _{iss}	-	1509	-	pF	V _{DS} = 650V V _{GS} = 0V T _J = 25°C V _{AC} = 25mV f = 1MHz
Output Capacitance	C _{oss}	-	130	-		
Reverse Transfer Capacitance	C _{rss}	-	16	-		
Gate Total Charge	Q _G	-	69.9	-	nC	V _{DS} = 400V V _{GS} = 0/18V I _D = 17.6A
Gate-Source charge	Q _{gs}	-	15.4	-		
Gate-Drain charge	Q _{gd}	-	28	-		
Turn-On Switching Energy	E _{ON}	-	87.4	-	μJ	V _{DD} = 400V V _{GS} = -4/+18V I _D = 17.6A R _G = 5Ω L = 100uH
Turn-Off Switching Energy	E _{OFF}	-	24	-		
Turn-on delay time	t _{d(on)}	-	10.56	-	ns	
Rise time	t _r	-	4.16	-		
Turn-off delay time	t _{d(off)}	-	19.52	-		
Fall time	t _f	-	6.4	-		
Gate resistance	R _G	-	0.9	-	Ω	V _{AC} = 25mV, f=1MHz



Body Diode Characteristics

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}		3.2		V	$V_{GS}=0V, I_{SD}=8.8A,$ $T_J=25^{\circ}C$
			2.7			$V_{GS}=0V, I_{SD}=8.8A,$ $T_J=175^{\circ}C$
Continuous Diode Forward Current	I_S		48		A	$V_{GS}=-4V, T_C=25^{\circ}C$
Body Diode Reverse Recovery Time	t_{rr}	-	20.4	-	ns	$V_R = 400V,$ $I_D = 17.6A$ $di/dt = 1000A/\mu S$
Body Diode Reverse Recovery Charge	Q_{rr}	-	114.1	-	nC	



Typical Performance Characteristics

Fig 1. Output Characteristic ($T_J = -55^\circ\text{C}$)

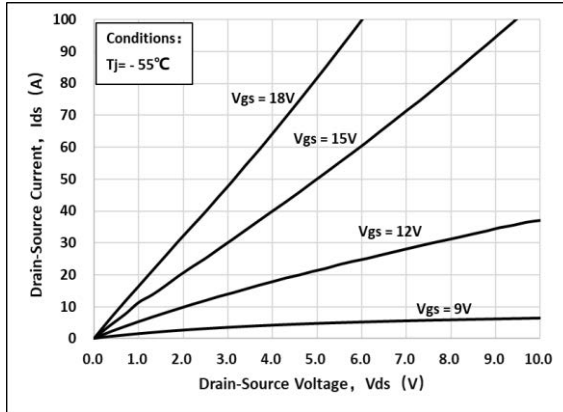


Fig 2. Output Characteristic ($T_J = 25^\circ\text{C}$)

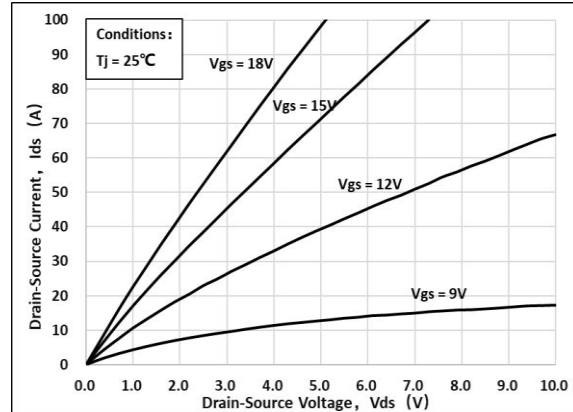


Fig 3. Output Characteristic ($T_J = 175^\circ\text{C}$)

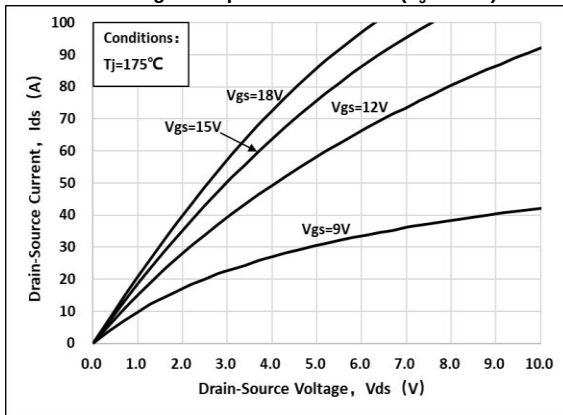


Fig 4: $R_{DS(on)}$ Vs I_{DS} Characteristic

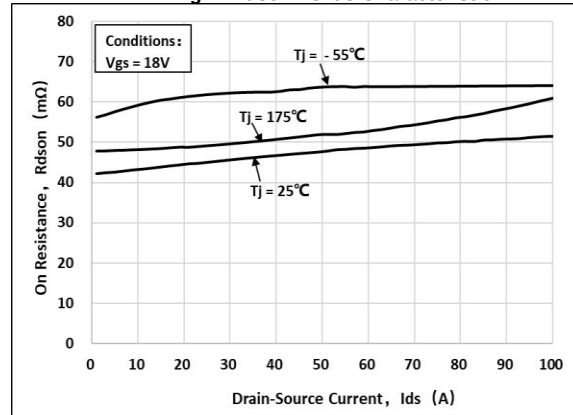


Fig 5: $R_{DS(on)}$ vs. Temperature

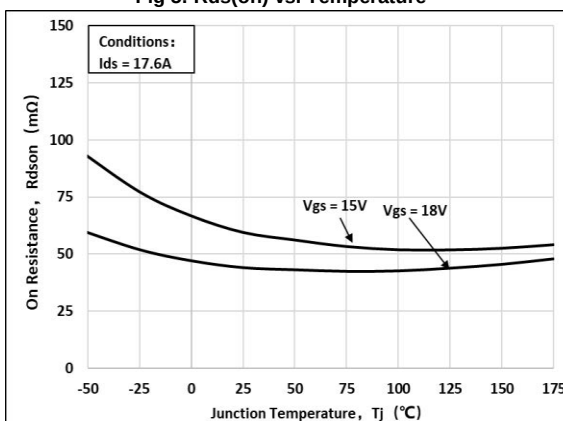


Fig 6: Transfer Characteristic

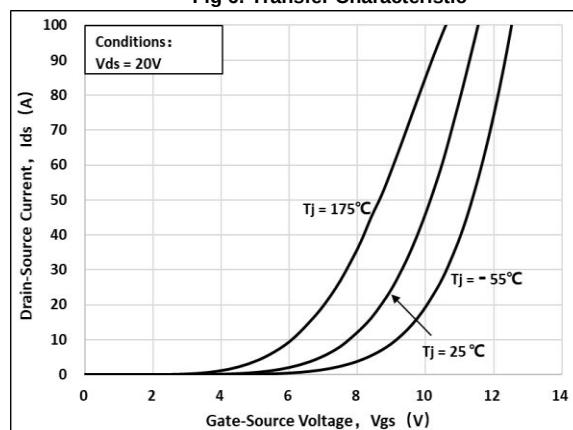




Fig 7: Body-diode Characteristic ($T_J = -55^\circ\text{C}$)

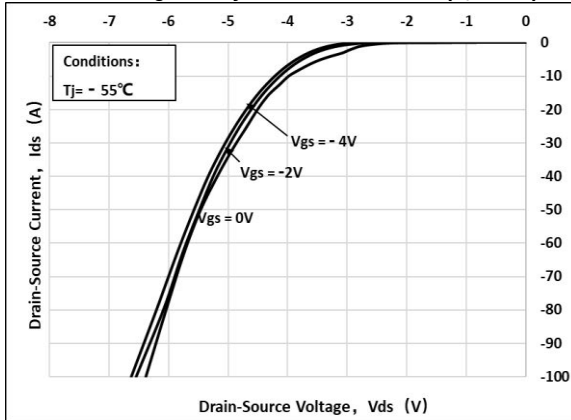


Fig 8: Body-diode Characteristic ($T_J = 25^\circ\text{C}$)

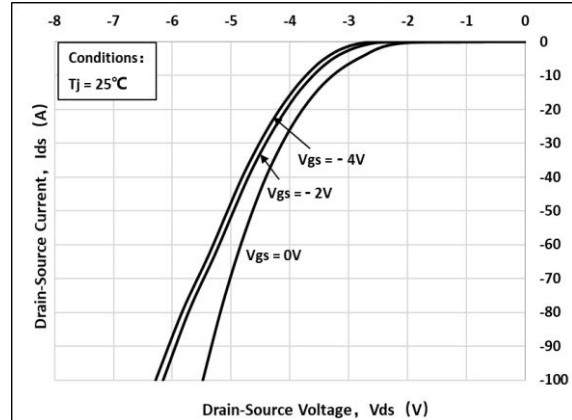


Fig 9: Body-diode Characteristic ($T_J = 175^\circ\text{C}$)

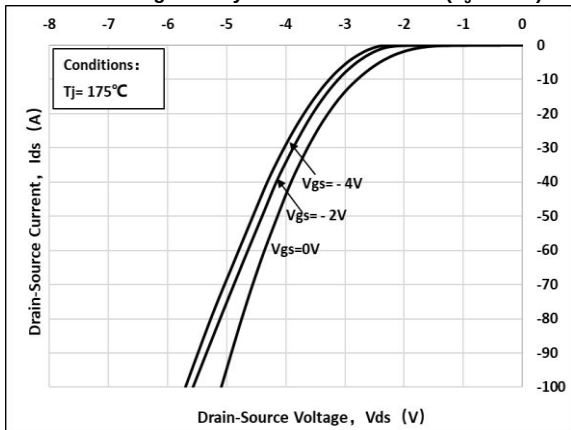


Fig 10: V_{th} Vs T_J Temperature Characteristic

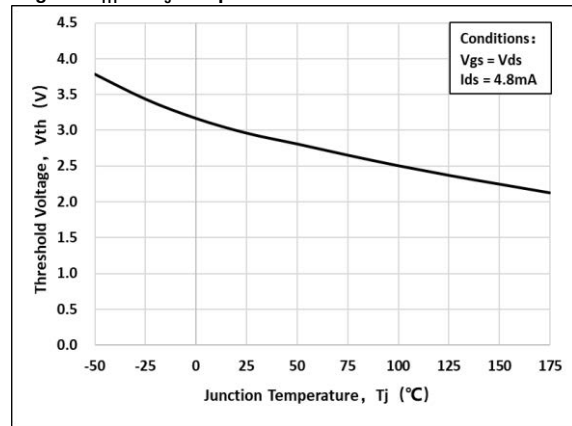


Fig 11: Gate Charge Characteristics

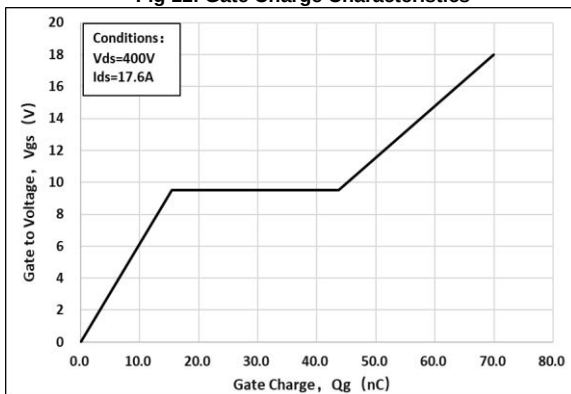


Fig 12: 3rd Quadrant Characteristic ($T_J = -55^\circ\text{C}$)

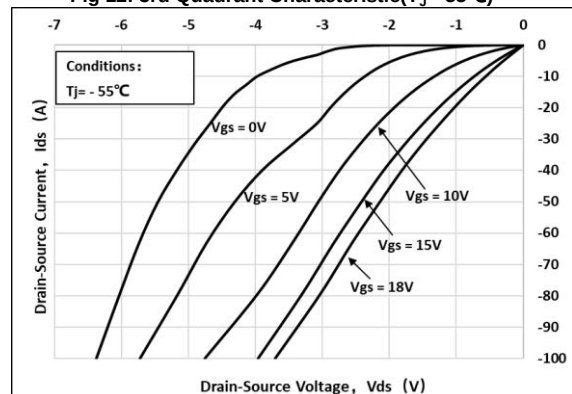




Fig 13: 3rd Quadrant Characteristic($T_J=25^\circ\text{C}$)

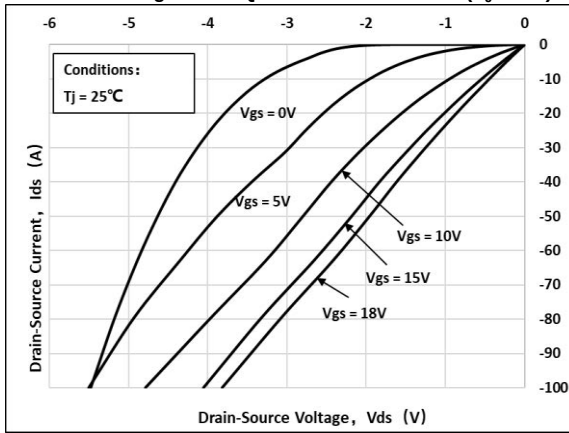


Fig 14: 3rd Quadrant Characteristic($T_J=175^\circ\text{C}$)

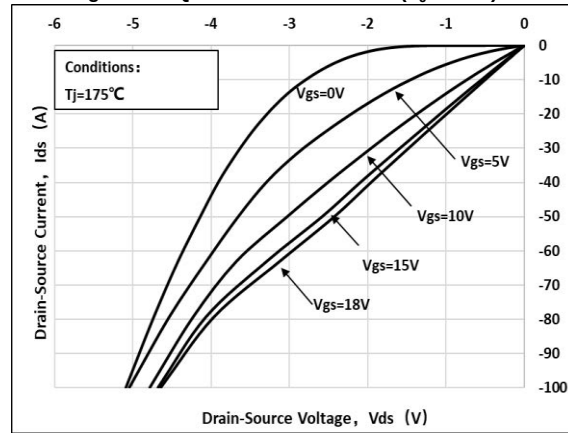


Fig 15: Capacitance Characteristic

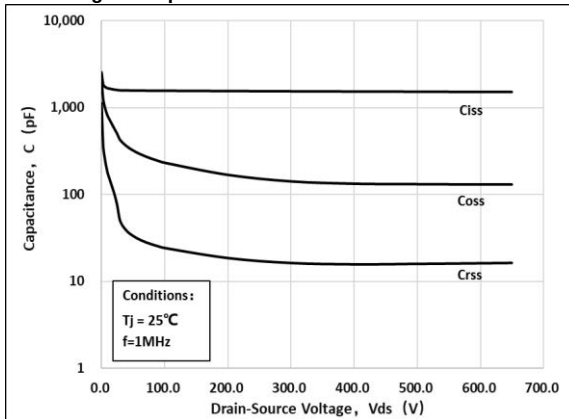


Fig 16: Safe Operating Area

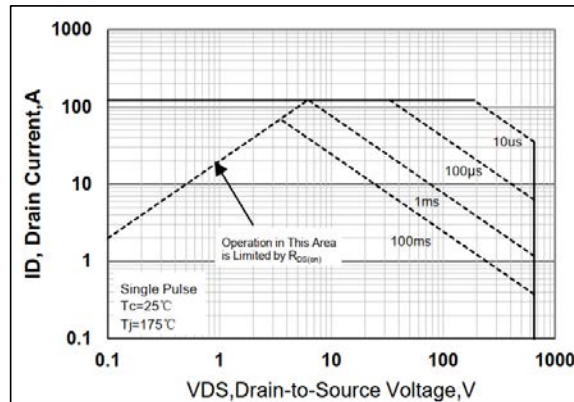
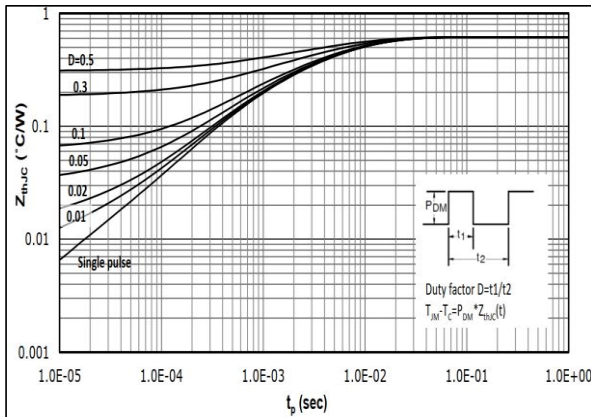


Fig 17: Transient Thermal Impedance





Test Circuit & Waveform

Figure A. Definition of switching times

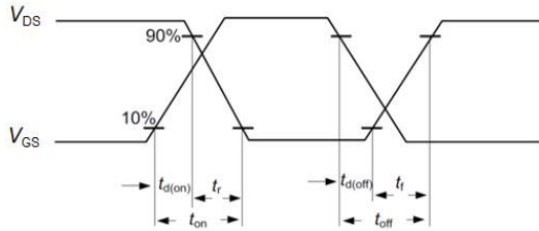


Figure B. Dynamic test circuit

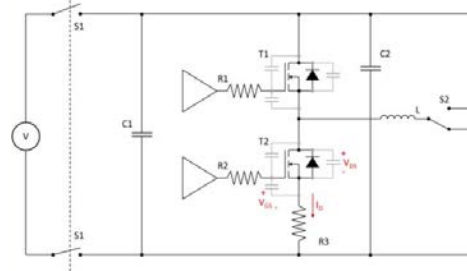
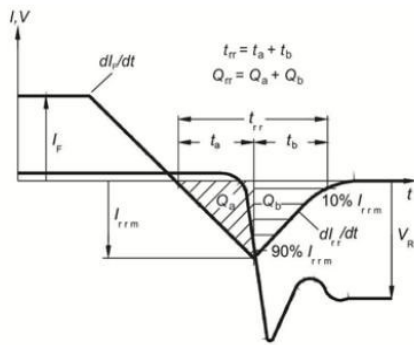


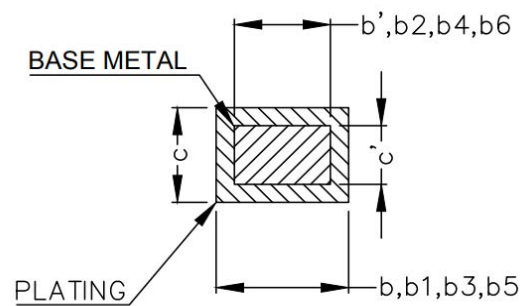
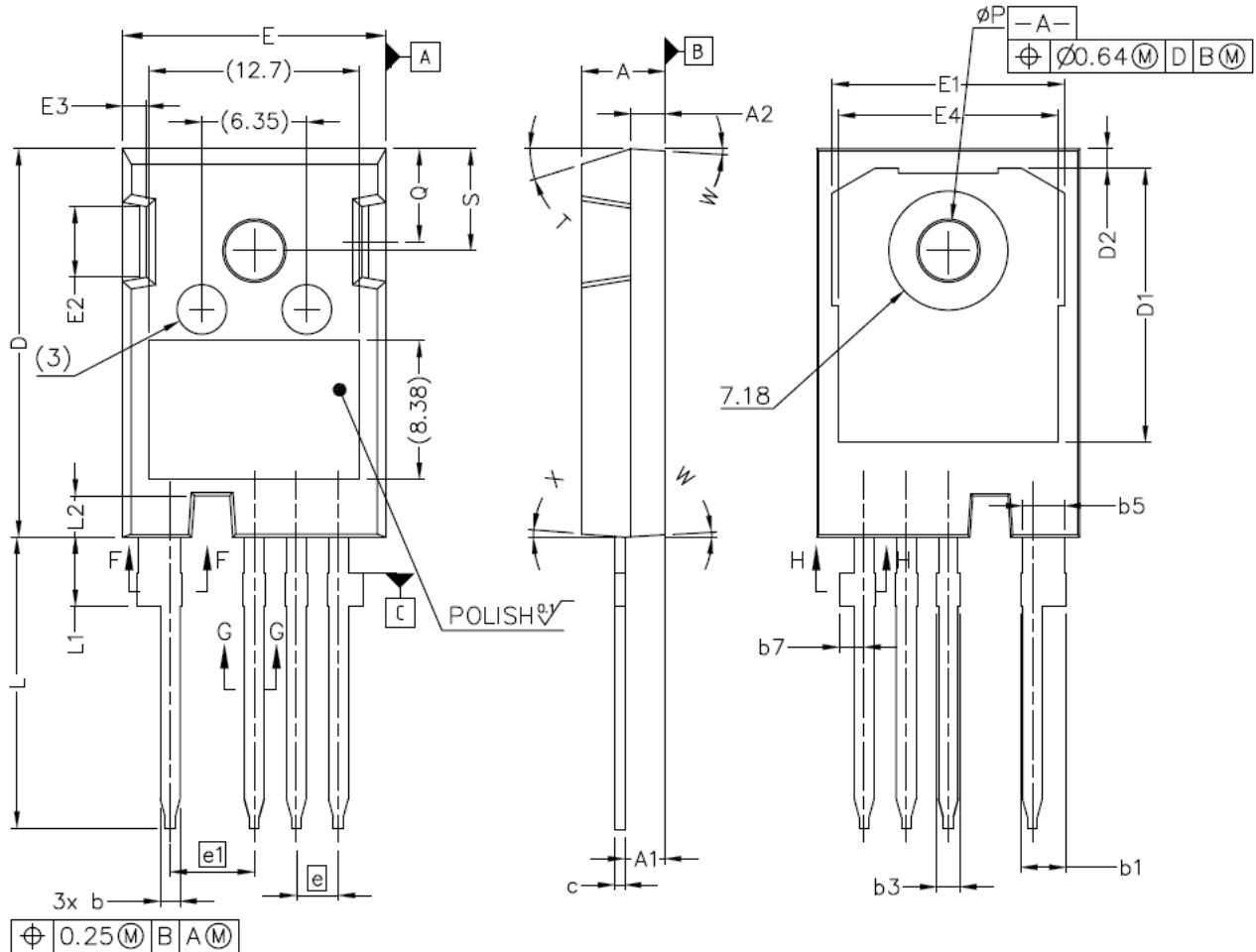
Figure C. Definition of body diodeswitching characteristics





Package Dimensions

Package TO247-4L



SECTION "F-F", "G-G" AND "H-H"
SCALE: NONE

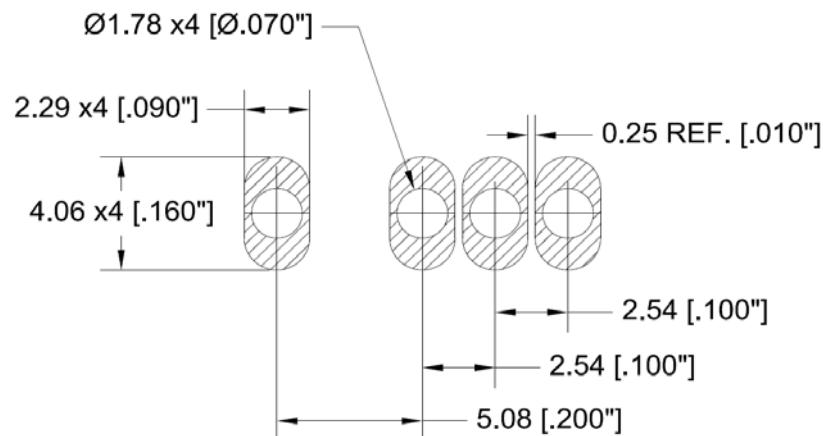


NOTE ;

1. ALL METAL SURFACES: TIN PLATED, EXCEPT AREA OF CUT
2. DIMENSIONING & TOLERANCEING CONFIRM TO ASME Y14.5M-1994.
3. ALL DIMENSIONS ARE IN MILLIMETERS.
ANGLES ARE IN DEGREES.
4. 'N' IS THE NUMBER OF TERMINAL POSITIONS

SYM	MILLIMETERS	
	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b`	1.07	1.28
b	1.07	1.33
b1	2.39	2.94
b2	2.39	2.84
b3	1.07	1.60
b4	1.07	1.50
b5	2.39	2.69
b6	2.39	2.64
b7	1.30	1.70
c`	0.55	0.65
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13

SYM	MILLIMETERS	
	MIN	MAX
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
e	2.54 BSC	
e1	5.08 BSC	
N*	4	
L	17.31	17.82
L1	3.97	4.37
L2	2.35	2.65
Ø P	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
T	17.5° REF.	
W	3.5° REF.	
X	4° REF.	





Attention

- Any and all HUA XUAN YANG ELECTRONICS products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your HUA XUAN YANG ELECTRONICS representative nearest you before using any HUA XUAN YANG ELECTRONICS products described or contained herein in such applications.
- HUA XUAN YANG ELECTRONICS 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 HUA XUAN YANG ELECTRONICS products described or contained herein.
- Specifications of any and all HUA XUAN YANG ELECTRONICS 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.
- HUA XUAN YANG ELECTRONICS CO.,LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or 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 HUA XUAN YANG ELECTRONICS products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining 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 permission of HUA XUAN YANG ELECTRONICS CO.,LTD.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. HUA XUAN YANG ELECTRONICS believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.
- 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 HUA XUAN YANG ELECTRONICS product that you intend to use.