



Features

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

Applications

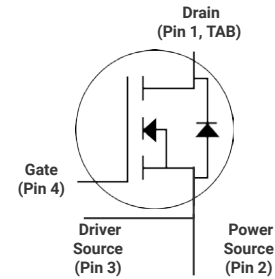
- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC-DC Converters
- Battery Chargers



Ordering Part Number	Package	Brand
NVH4L040N65S3F	TO-247-4L	HXY MOSFET



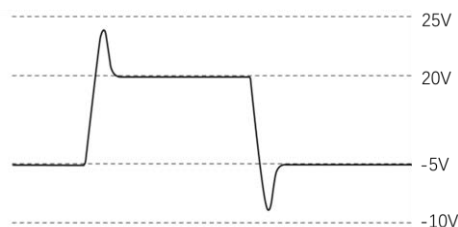
TO-247-4L
Package



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

Symbol	Parameter	Value	Unit	Test Conditions
V_{DS}	Drain - Source Voltage	650	V	$V_{GS} = 0\text{ V}$, $I_D = 100\text{ }\mu\text{A}$
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	$V_{GS} = 18\text{ V}$, $T_C = 25^\circ\text{C}$
		35		$V_{GS} = 18\text{ V}$, $T_C = 100^\circ\text{C}$
$I_{D(pulse)}$	Pulsed Drain Current	123	A	Pulse width t_p limited by T_{jmax}
P_{tot}	Power Dissipation	241	W	$T_C = 25^\circ\text{C}$
T_J, T_{stg}	Operating Junction and Storage Temperature	-40 to +175	$^\circ\text{C}$	

•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 ($T_J = -55^\circ\text{C}$)

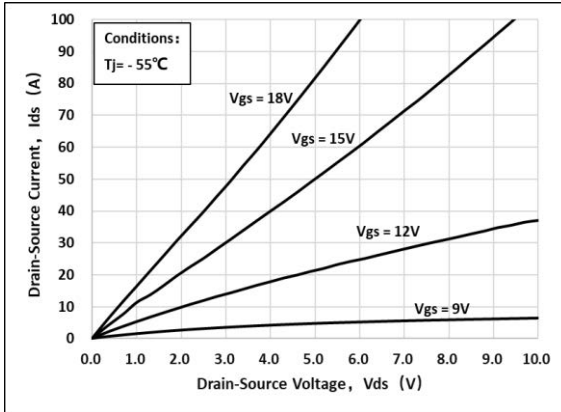


Fig 2. Output Characteristic ($T_J = 25^\circ\text{C}$)

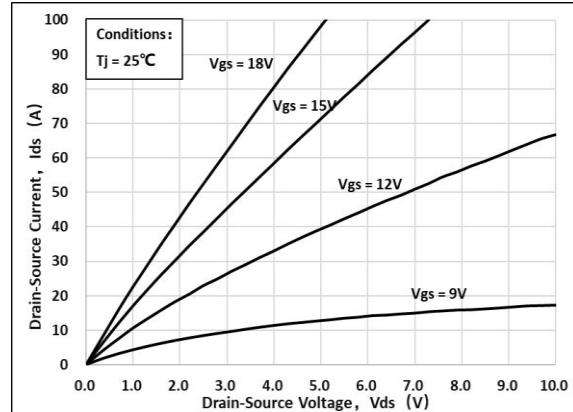


Fig 3. Output Characteristic ($T_J = 175^\circ\text{C}$)

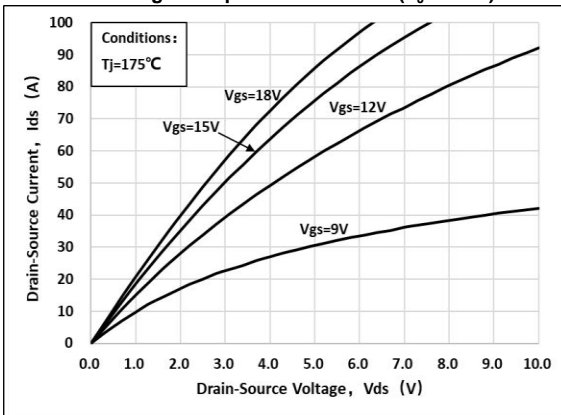


Fig 4: $R_{DS(on)}$ Vs I_{DS} Characteristic

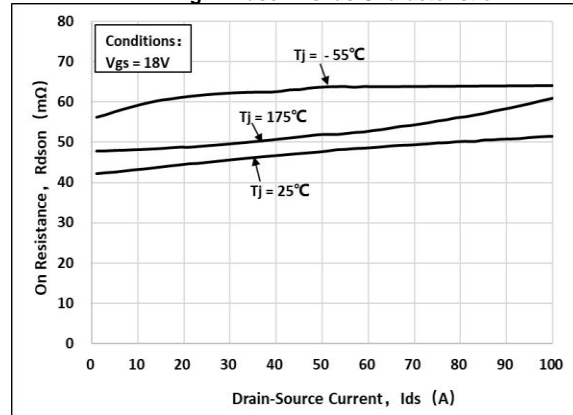


Fig 5: $R_{DS(on)}$ vs. Temperature

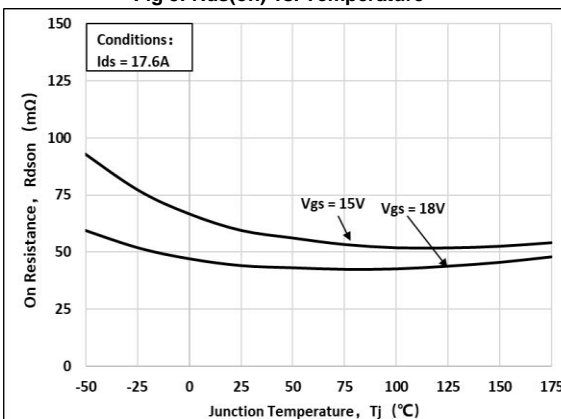


Fig 6: Transfer Characteristic

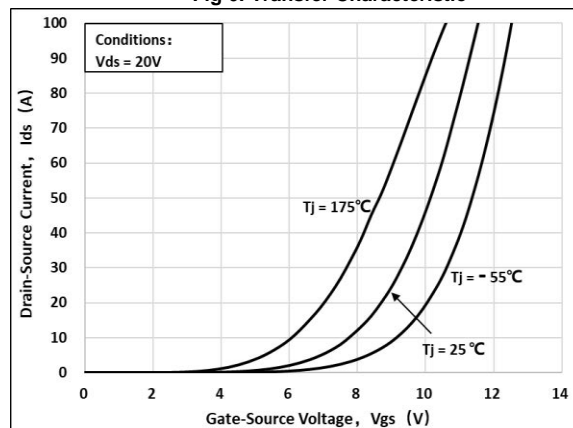




Fig 7: Body-diode Characteristic ($T_J = -55^\circ\text{C}$)

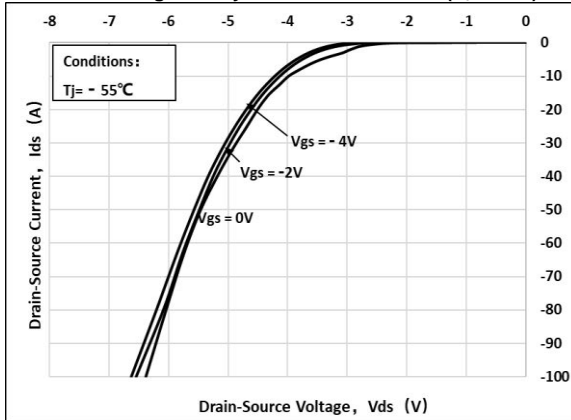


Fig 8: Body-diode Characteristic ($T_J = 25^\circ\text{C}$)

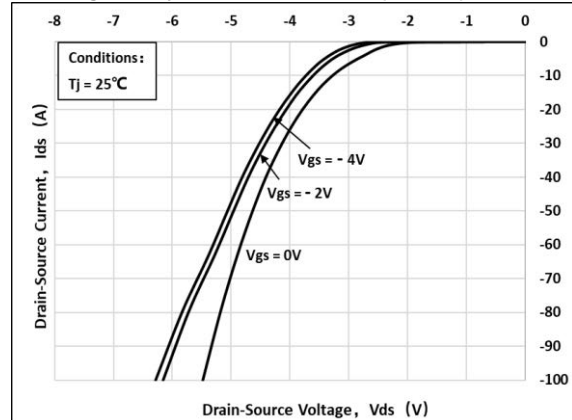


Fig 9: Body-diode Characteristic ($T_J = 175^\circ\text{C}$)

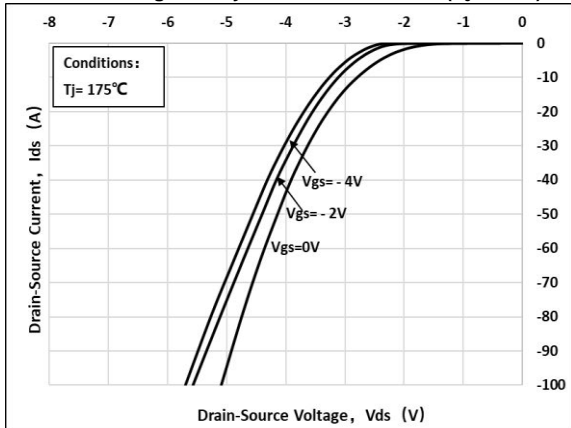


Fig 10: V_{TH} Vs T_J Temperature Characteristic

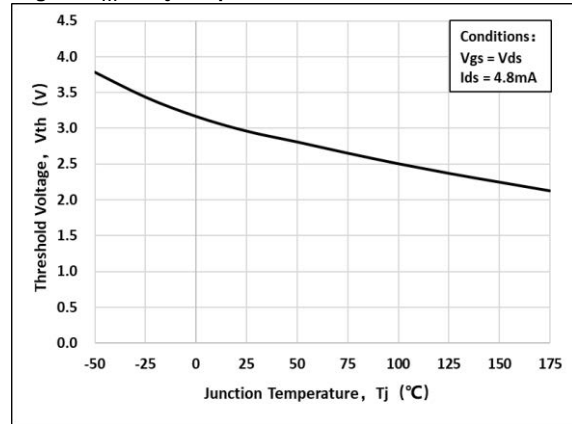


Fig 11: Gate Charge Characteristics

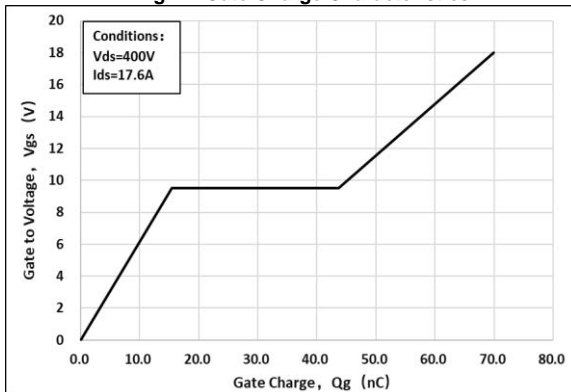


Fig 12: 3rd Quadrant Characteristic ($T_J = -55^\circ\text{C}$)

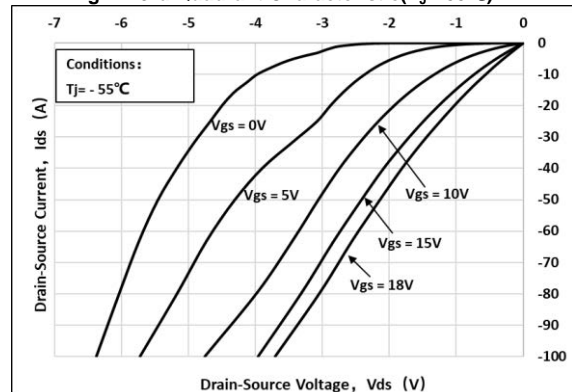




Fig 13: 3rd Quadrant Characteristic($T_J=25^\circ\text{C}$)

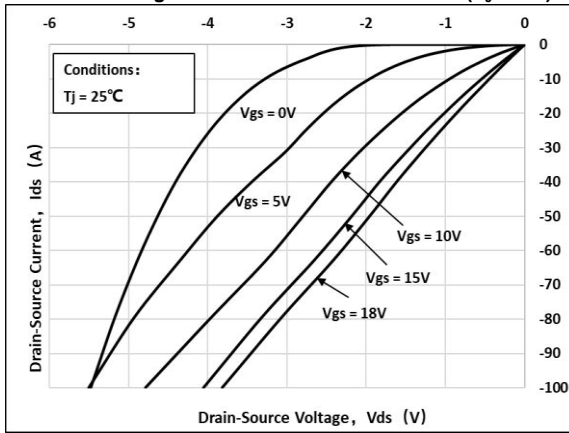


Fig 14: 3rd Quadrant Characteristic($T_J=175^\circ\text{C}$)

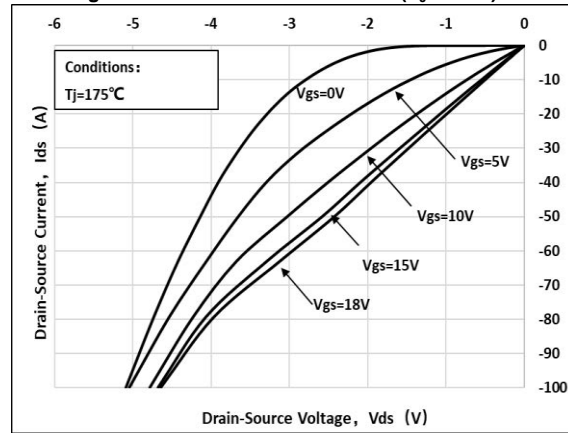


Fig 15: Capacitance Characteristic

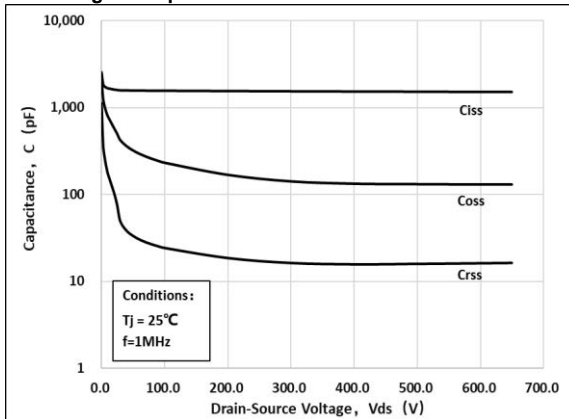


Fig 16: Safe Operating Area

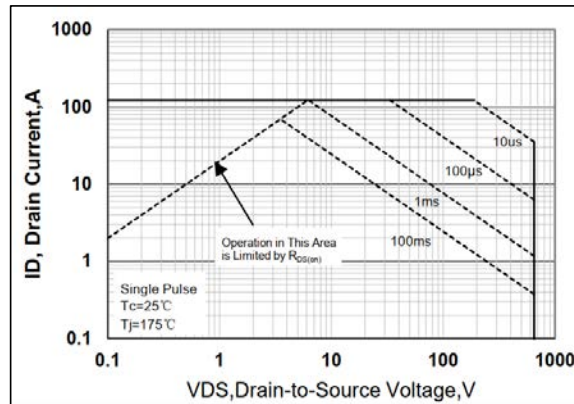
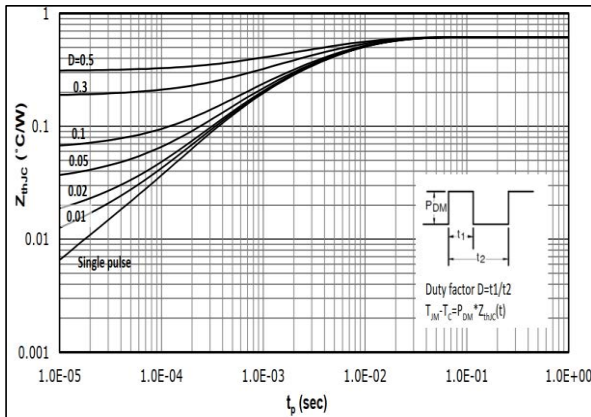


Fig 17: Transient Thermal Impedance





Test Circuit & Waveform

Figure A. Definition of switching times

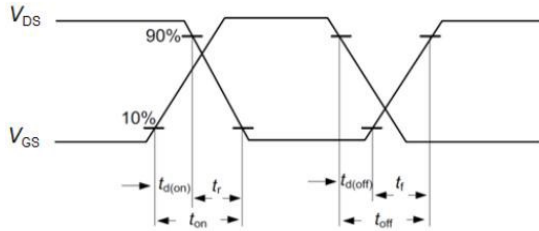


Figure B. Dynamic test circuit

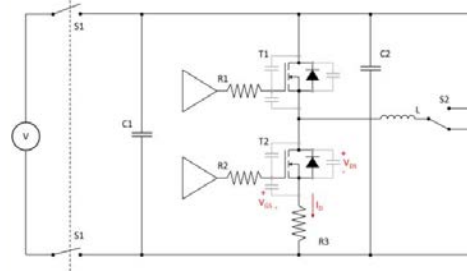
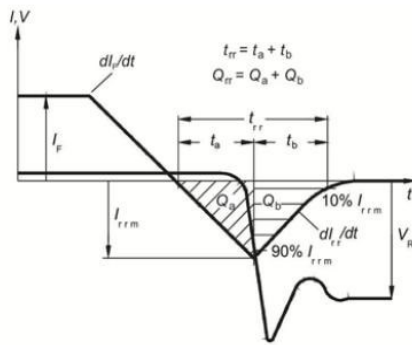


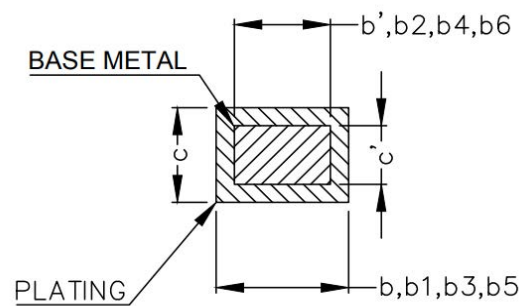
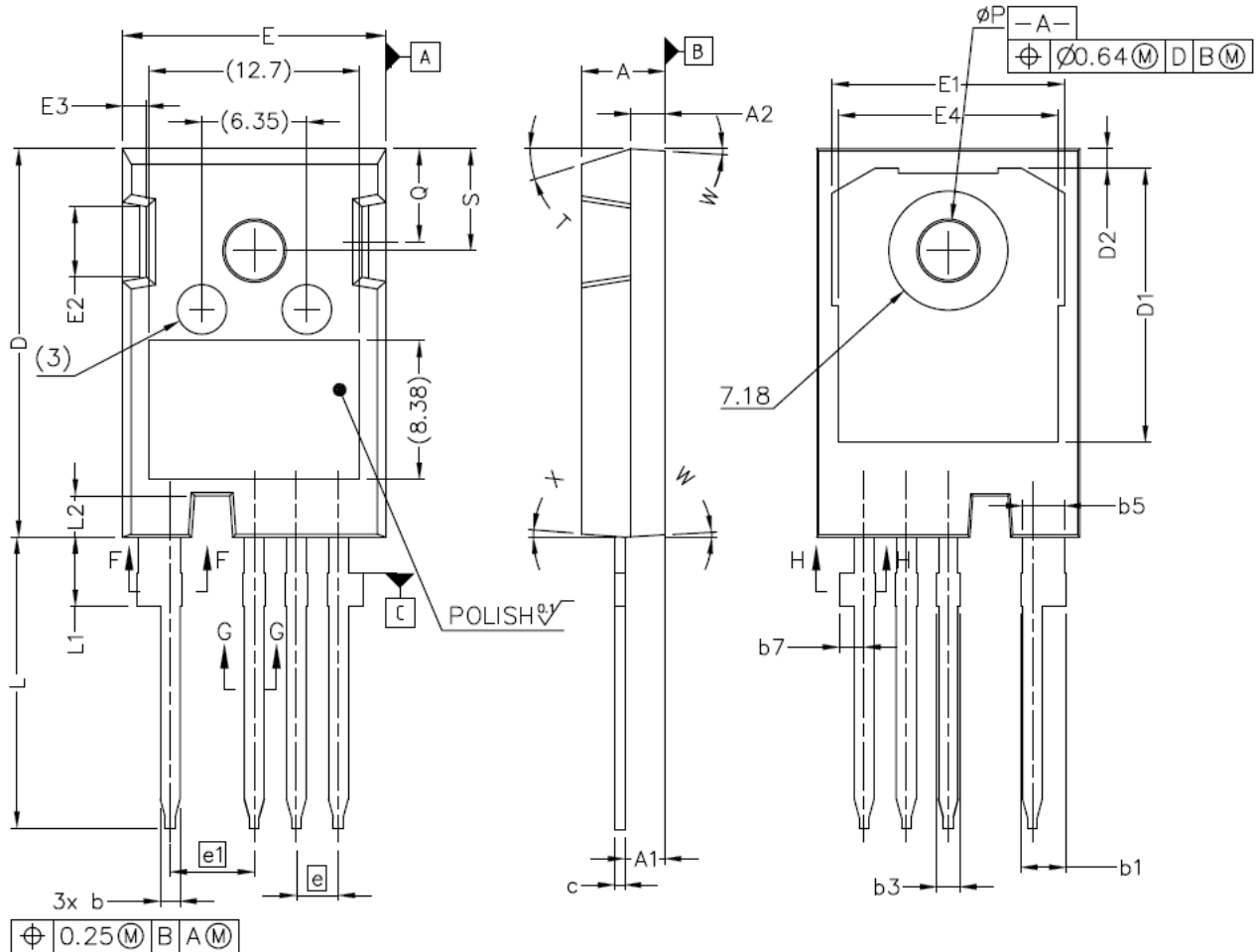
Figure C. Definition of body diodeswitching characteristics





Package Dimensions

Package TO247-4L



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

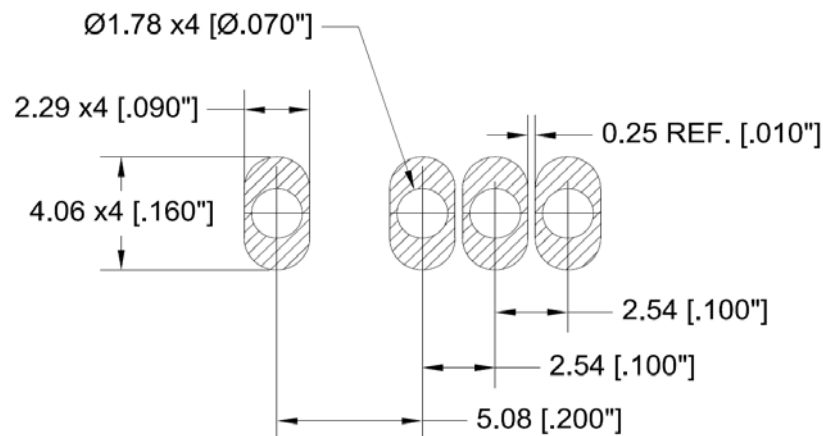


NOTE ;

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.	





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