



Features

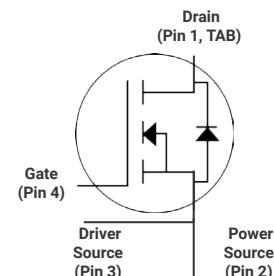
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggedness

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



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_{\thetaJC}	Thermal Resistance from Junction to Case	0.62	°C/W	
R_{\thetaJA}	Thermal Resistance From Junction to Ambient	40		

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

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristics						
Drain-source breakdown voltage	BV_{DSS}	650	-	-	V	$V_{GS}=0V, I_D=250\mu A$
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	100	μA	$V_{DS}=650V, V_{GS}=0V$ $T_j=25^\circ C$ $T_j=175^\circ C$
Gate-source leakage current	I_{GSS}	-		250	nA	$V_{GS}=18V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	45	59	$m\Omega$	$V_{GS}=18V, I_D=17.6A$ $T_j=25^\circ C$ $T_j=175^\circ C$
Transconductance	g_{fs}	-	6.4	-	S	$V_{DS}=20V, I_D=17.6A$
Dynamic Characteristics						
Input Capacitance	C_{iss}	-	1509	-	pF	$V_{DS} = 650V$ $V_{GS} = 0V$ $T_j = 25^\circ C$ $V_{AC} = 25mV$ $f = 1MHz$
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	$V_{DD} = 400V$ $V_{GS} = -4/+18V$ $I_D = 17.6A$ $R_G = 5\Omega$ $L = 100\mu H$
Turn-Off Switching Energy	E_{OFF}	-	24	-		
Turn-on delay time	$t_{d(on)}$	-	10.56	-		
Rise time	t_r	-	4.16	-	ns	
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 ($T_J = -55^\circ\text{C}$)

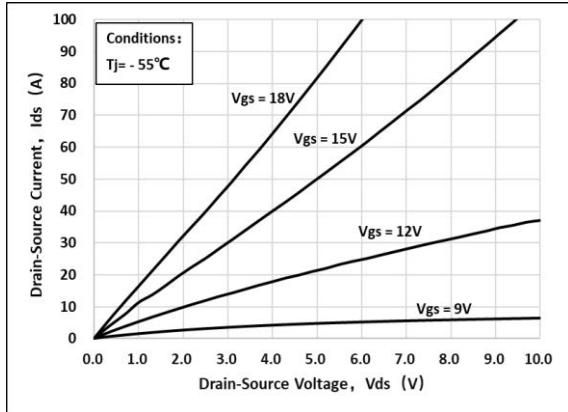


Fig 2. Output Characteristic ($T_J = 25^\circ\text{C}$)

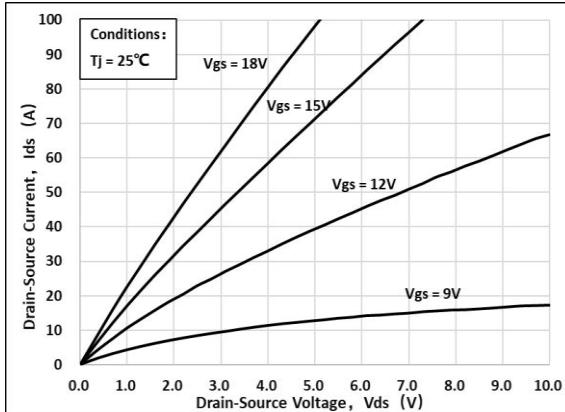


Fig 3. Output Characteristic ($T_J = 175^\circ\text{C}$)

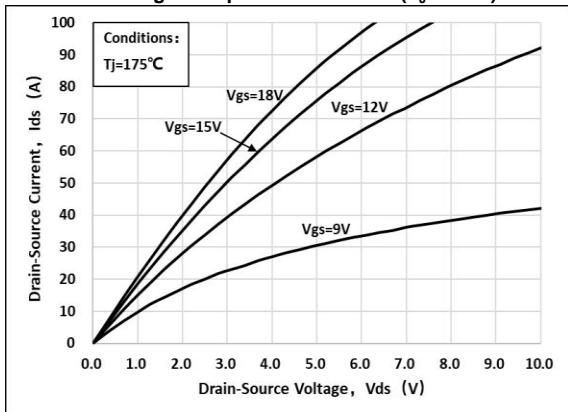


Fig 4: $R_{ds(on)}$ Vs Id_s Characteristic

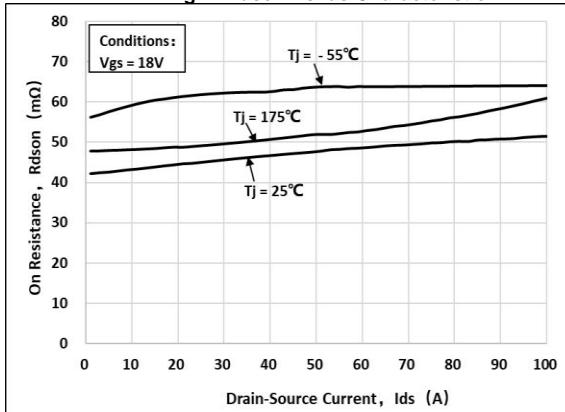


Fig 5: $R_{ds(on)}$ vs. Temperature

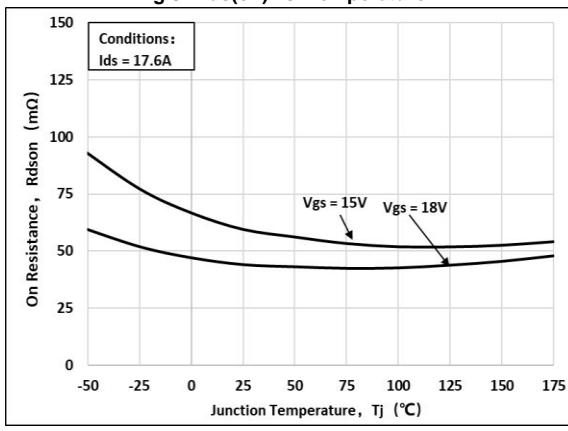


Fig 6: Transfer Characteristic

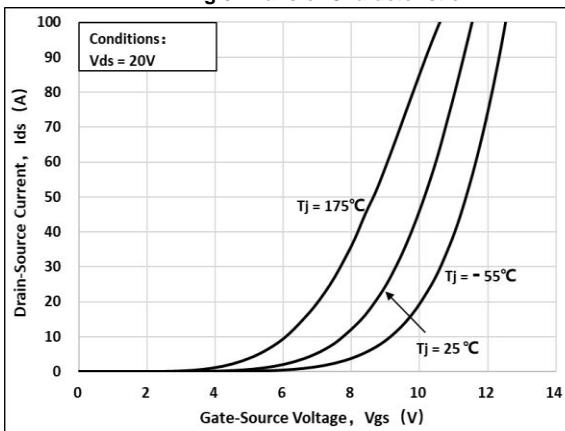




Fig 7: Body-diode Characteristic ($T_j = -55^\circ\text{C}$)

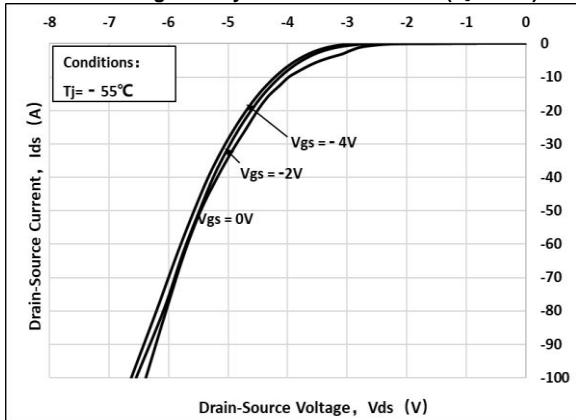


Fig 8: Body-diode Characteristic ($T_j = 25^\circ\text{C}$)

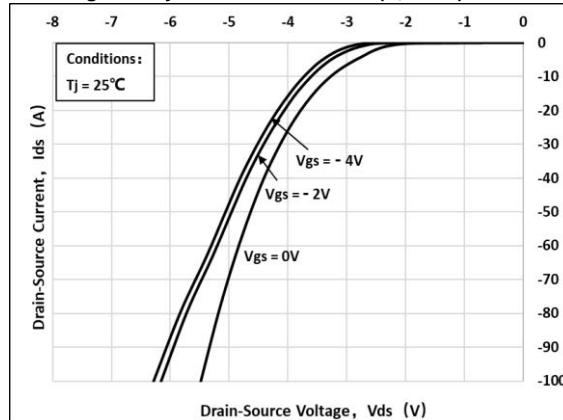


Fig 9: Body-diode Characteristic ($T_j = 175^\circ\text{C}$)

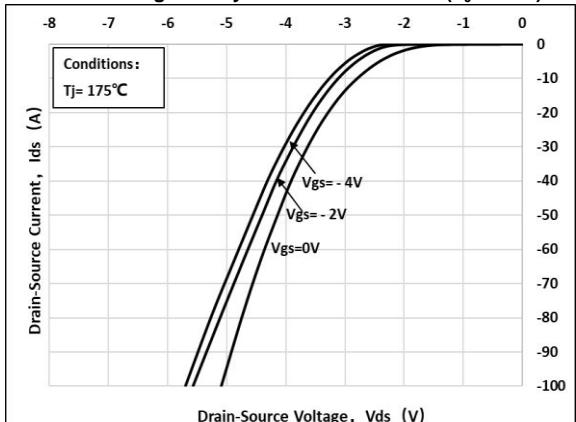


Fig 10: V_{th} Vs T_j Temperature Characteristic

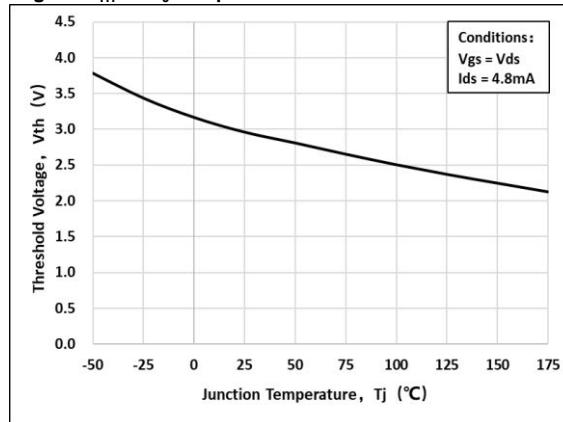


Fig 11: Gate Charge Characteristics

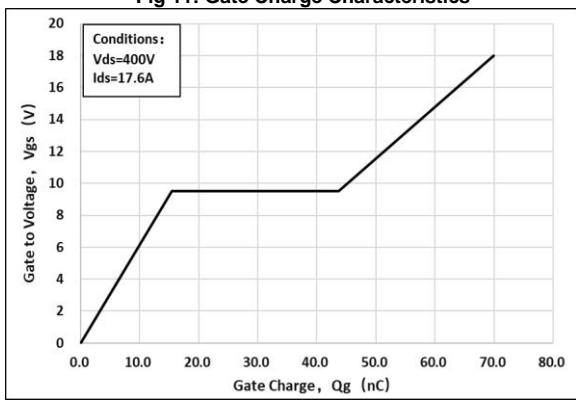


Fig 12: 3rd Quadrant Characteristic ($T_j = -55^\circ\text{C}$)

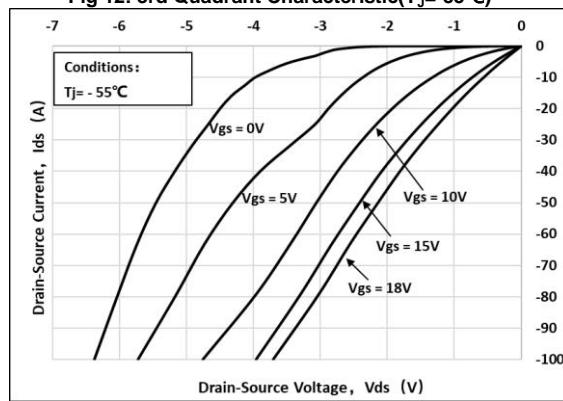




Fig 13: 3rd Quadrant Characteristic($T_J=25^\circ\text{C}$)

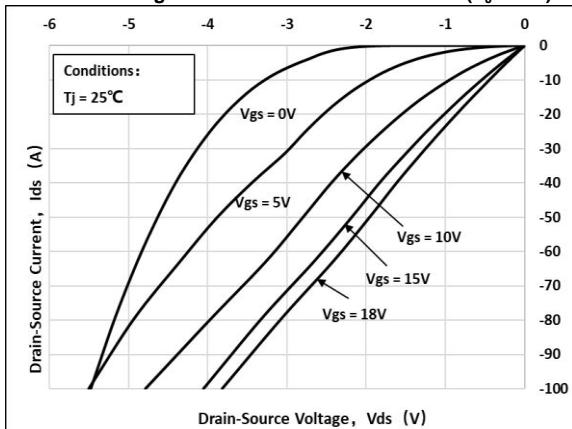


Fig 14: 3rd Quadrant Characteristic($T_J=175^\circ\text{C}$)

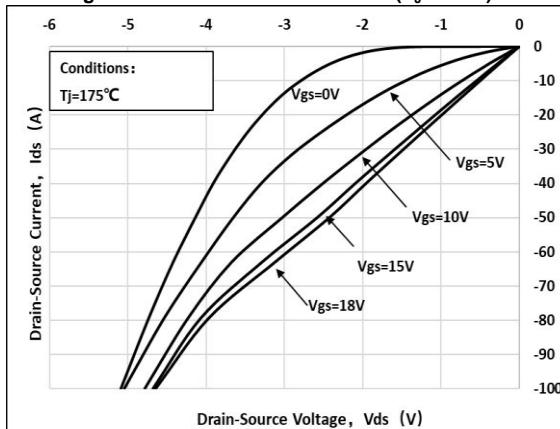


Fig 15: Capacitance Characteristic

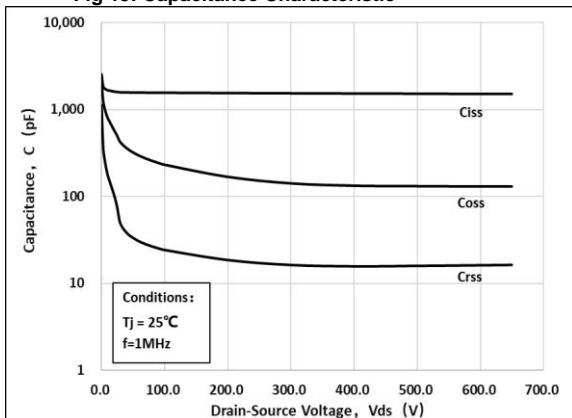


Fig 16: Safe Operating Area

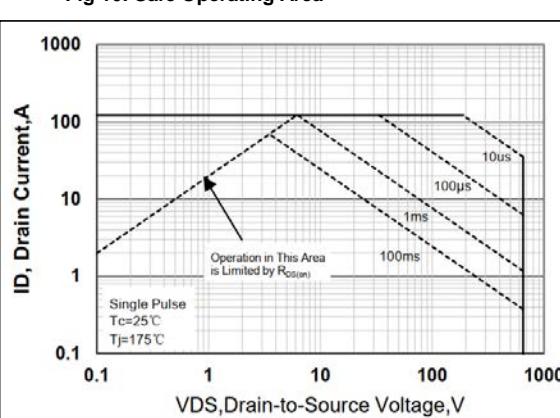
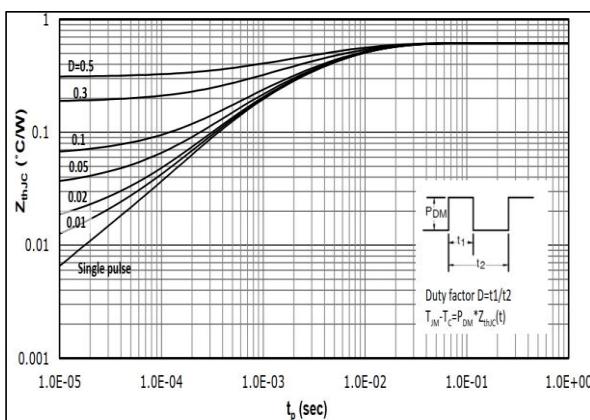


Fig 17: Transient Thermal Impedance



Test Circuit & Waveform

Figure A. Definition of switching times

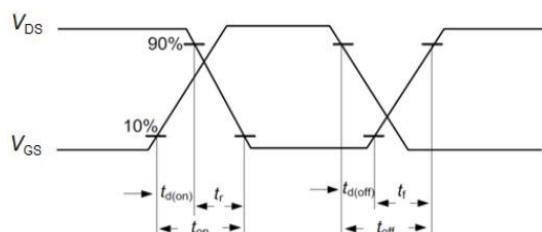


Figure B. Dynamic test circuit

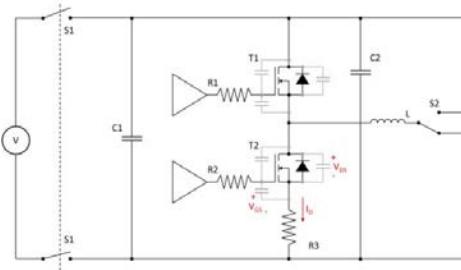
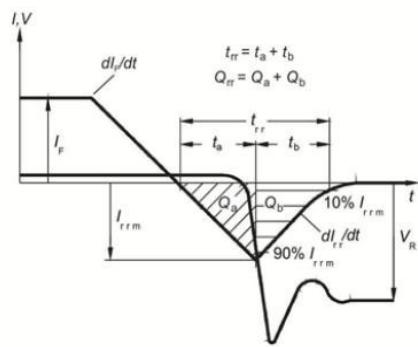


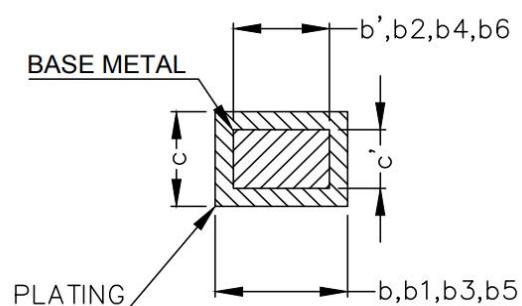
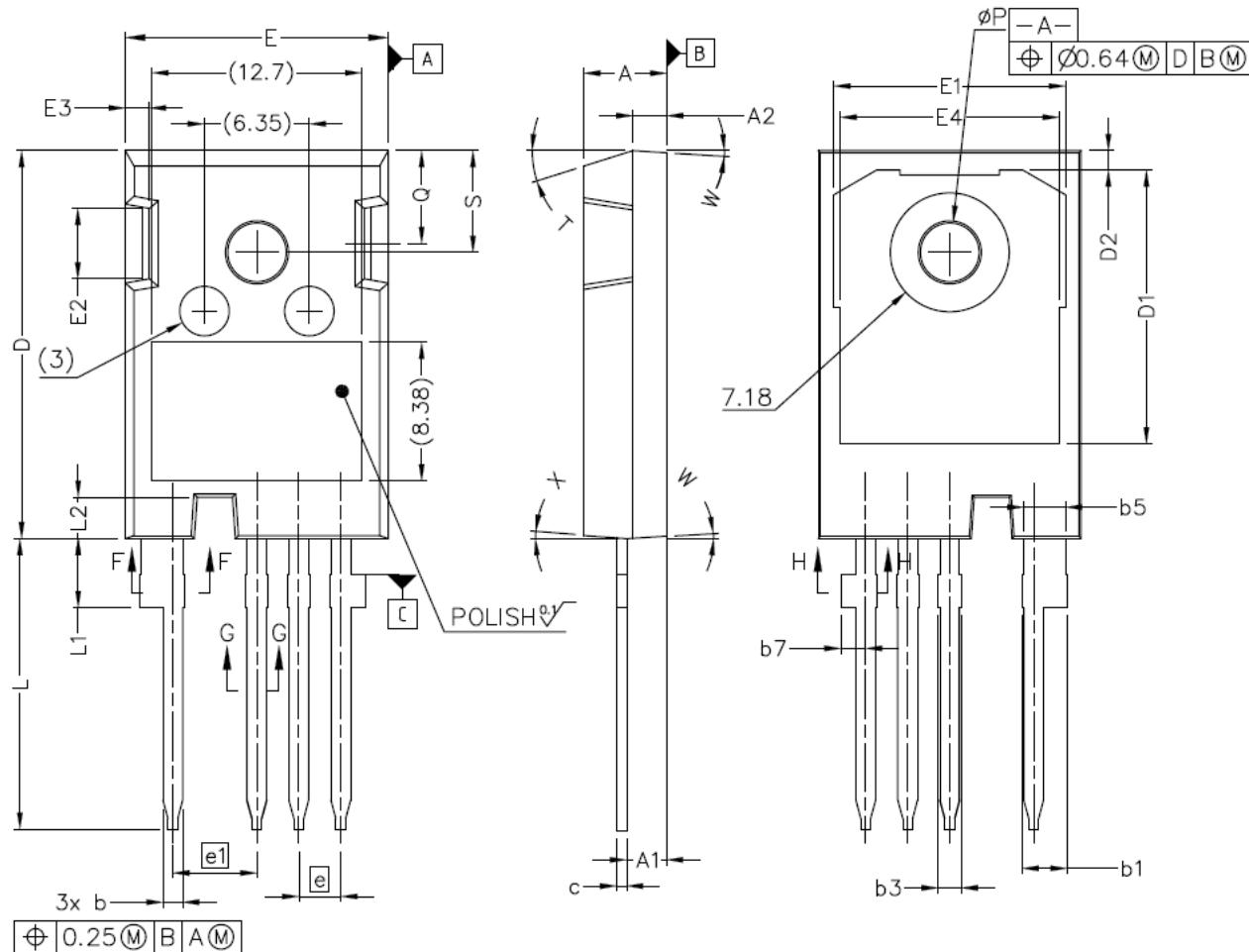
Figure C. Definition of body diodeswitching characteristics





Package Dimensions

Package TO247-4L



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

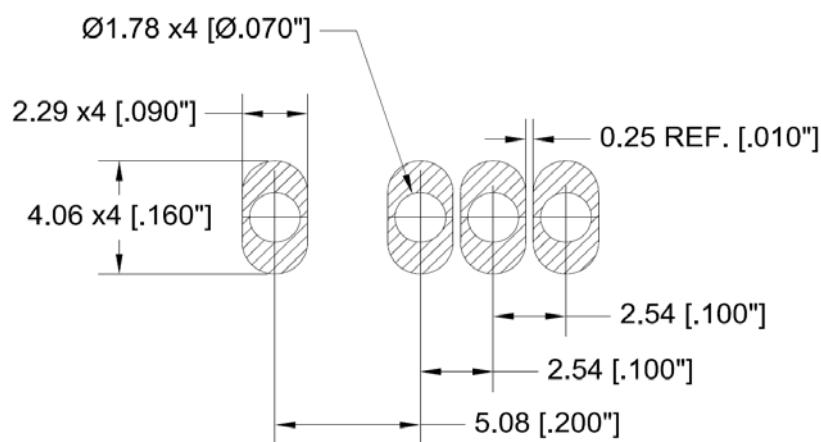


NOTE :

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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