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# NDBA170N06A

## N-Channel Power MOSFET 60V, 170A, 3.3mΩ, TO-263

### Features

- On-resistance  $R_{DS(on)}=2.5m\Omega$ (typ.)
- Input Capacitance  $C_{iss}=15800pF$ (typ.)
- Halogen free compliance

### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ C$

Parameter	Symbol	Value	Unit
Drain to Source Voltage	$V_{DSS}$	60	V
Gate to Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current (DC)	$I_D$	170	A
Drain Current (DC) Limited by Package	$I_{DL}$	100	A
Drain Current (Pulse) $PW \leq 10\mu s$ , duty cycle $\leq 1\%$	$I_{DP}$	600	A
Power Dissipation $T_c=25^\circ C$	$P_D$	90	W
Junction Temperature	$T_J$	150	$^\circ C$
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ C$
Avalanche Energy (Single Pulse) *1	$E_{AS}$	571	mJ
Avalanche Current *2	$I_{AV}$	70	A
Lead Temperature for Soldering Purposes, 3mm from Case for 10 Seconds	$T_L$	260	$^\circ C$

### Thermal Resistance Ratings

Parameter	Symbol	Value	Unit
Junction- to-Case(Drain) Steady State	$R_{\theta JC}$	1.39	$^\circ C/W$
Junction-to-Ambient *3	$R_{\theta JA}$	62.5	

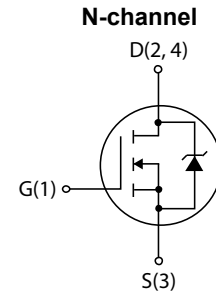
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Note : \*1  $V_{DD}=36V$ ,  $L=100\mu H$ ,  $I_{AV}=70A$  (Fig.1)

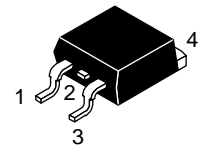
\*2  $L \leq 100\mu H$ , Single Pulse

\*3 Surface mounted on FR4 board using recommended footprint

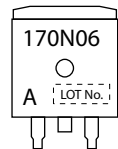
### Electrical Connection



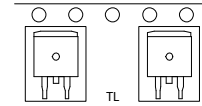
### Marking



TO-263  
CASE 418AJ



### Packing Type:TL



### Ordering & Package Information

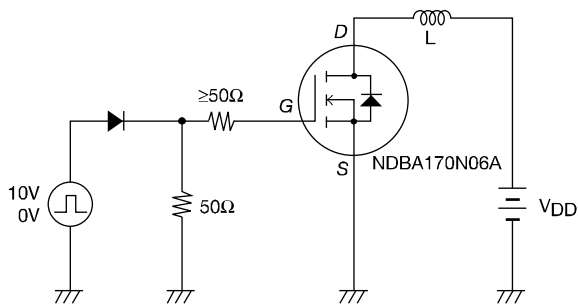
Device	Package	Shipping
NDBA170N06AT4H Pb-free and Halogen Free	TO-263	800 pcs. / reel

# NDBA170N06A

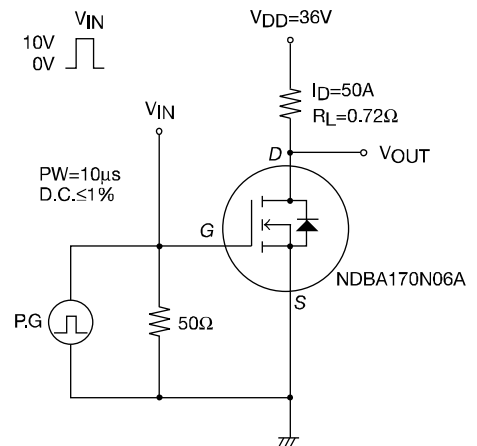
## Electrical Characteristics at Ta = 25°C

Parameter	Symbol	Conditions	Value			Unit	
			min	typ	max		
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D=1mA, V_{GS}=0V$	60			V	
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$			10	$\mu A$	
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 200$	nA	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=10V, I_D=1mA$	1.2		2.6	V	
Forward Transconductance	$g_{FS}$	$V_{DS}=10V, I_D=50A$		150		S	
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D=50A, V_{GS}=10V$		2.5	3.3	$m\Omega$	
Input Capacitance	$C_{iss}$	$V_{DS}=20V, f=1MHz$		15800		pF	
Output Capacitance	$C_{oss}$				1000		pF
Reverse Transfer Capacitance	$C_{rss}$				740		pF
Turn-ON Delay Time	$t_{d(on)}$	See Fig.2		115		ns	
Rise Time	$t_r$			550		ns	
Turn-OFF Delay Time	$t_{d(off)}$			750		ns	
Fall Time	$T_f$			380		ns	
Total Gate Charge	$Q_g$	$V_{DS}=36V, V_{GS}=10V, I_D=100A$		280		nC	
Gate to Source Charge	$Q_{gs}$			56		nC	
Gate to Drain "Miller" Charge	$Q_{gd}$			60		nC	
Forward Diode Voltage	$V_{SD}$		$I_S=100A, V_{GS}=0V$		0.9	1.2	V
Reverse Recovery Time	$t_{rr}$	See Fig.3		100		ns	
Reverse Recovery Charge	$Q_{rr}$	$I_S=100A, V_{GS}=0V, di/dt=100A/\mu s$		310		nC	

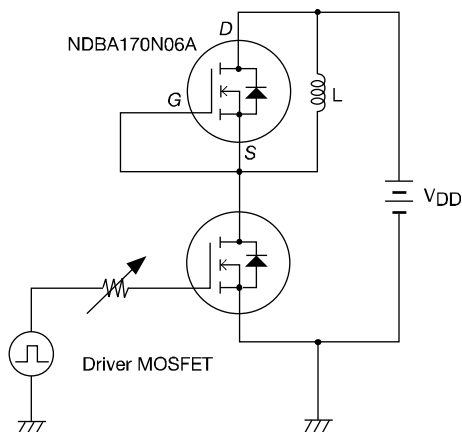
**Fig.1 Unclamped Inductive Switching Test Circuit**



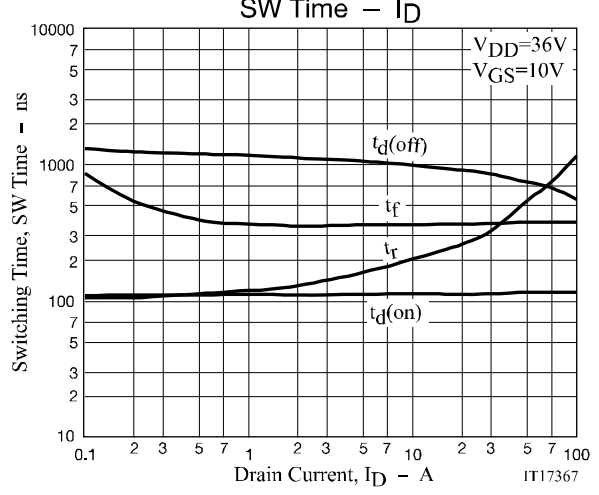
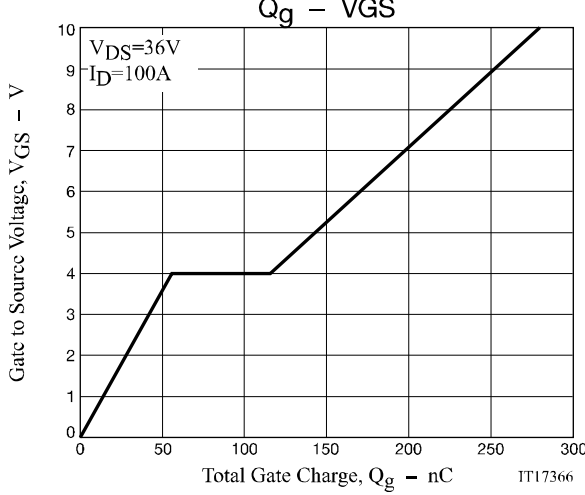
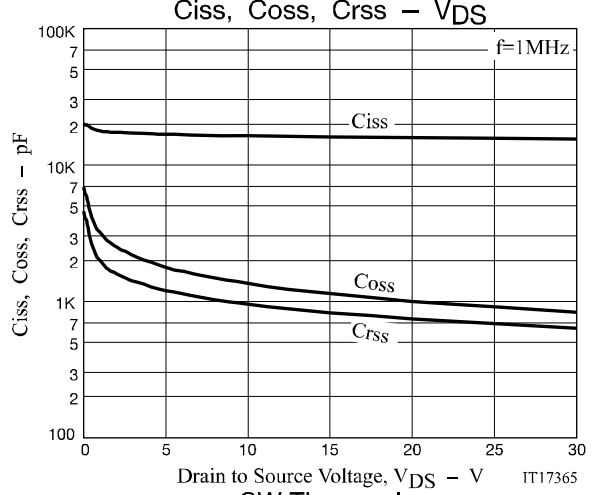
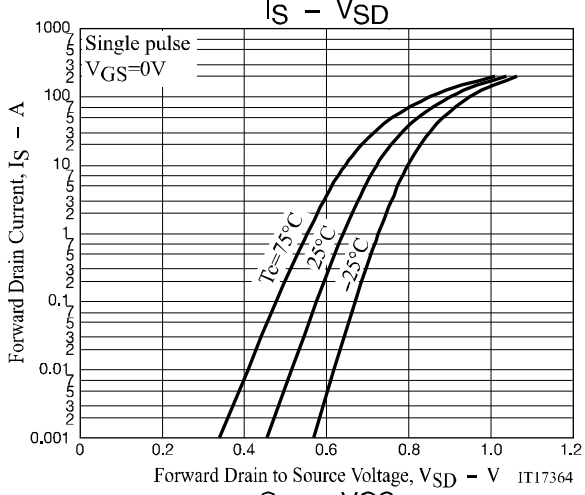
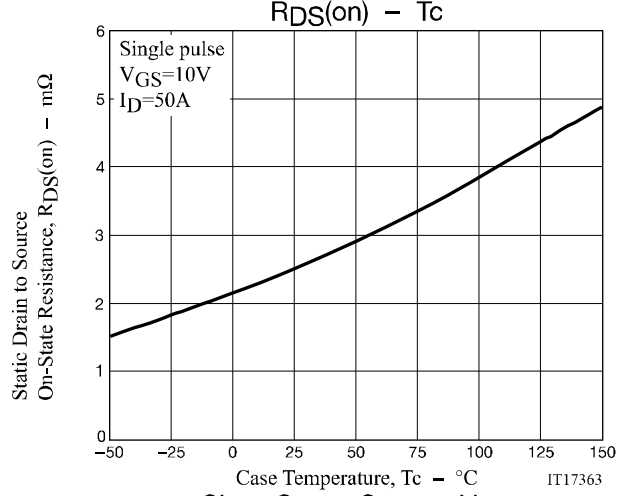
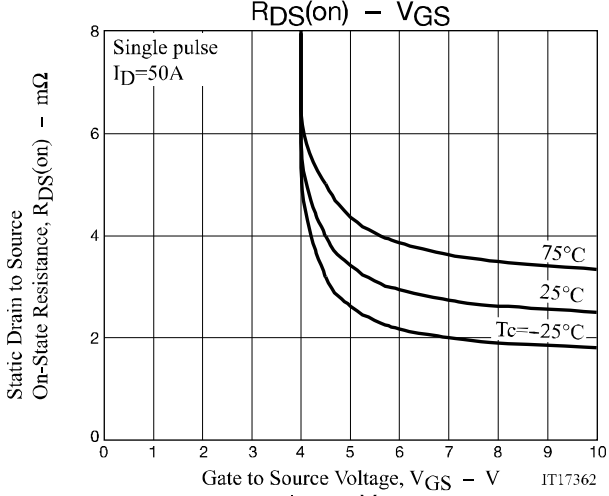
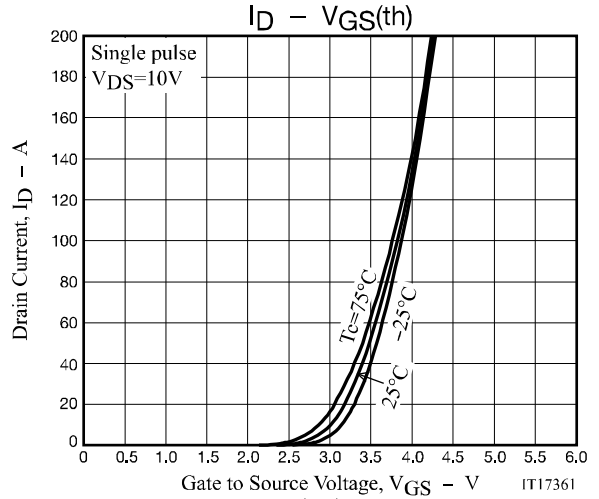
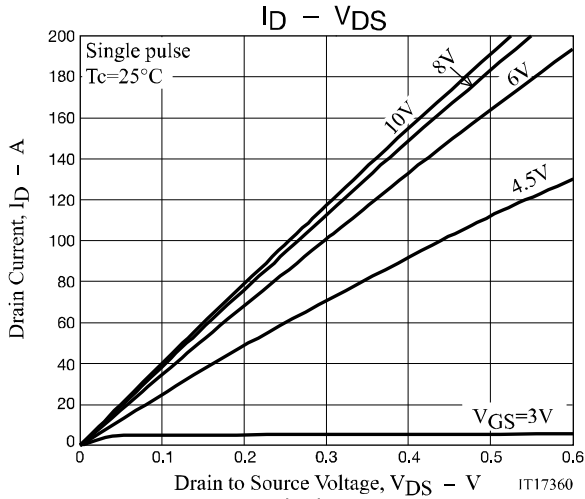
**Fig.2 Switching Time Test Circuit**



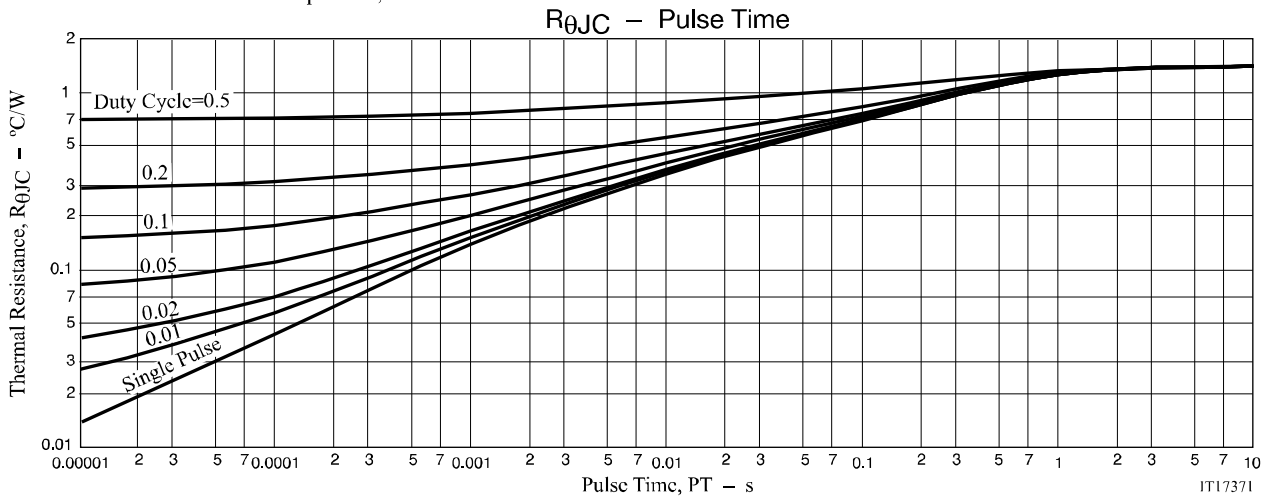
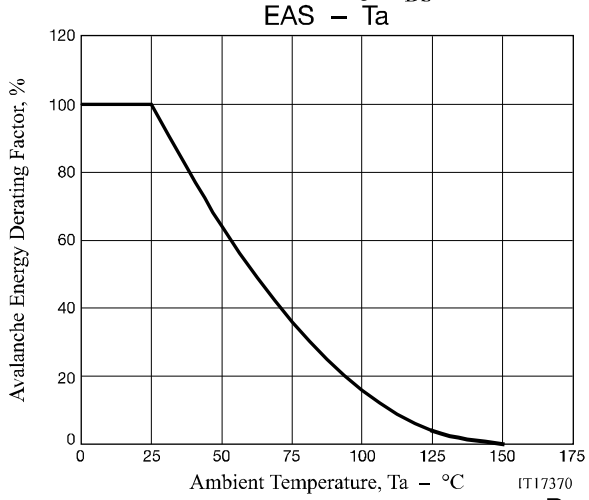
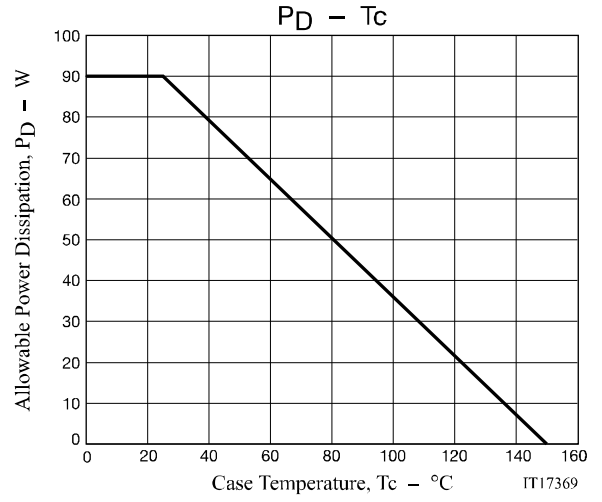
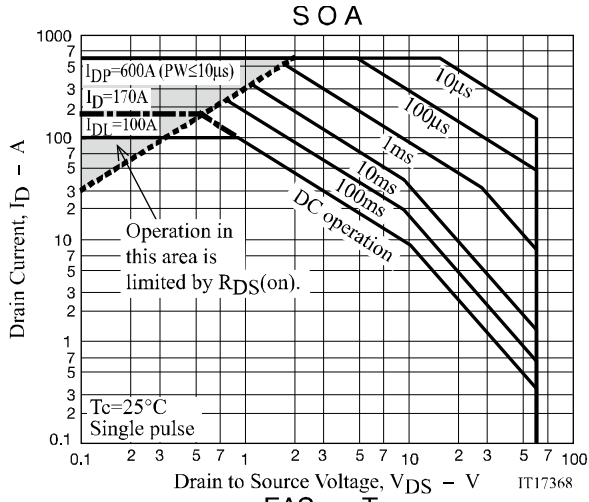
**Fig.3 Reverse Recovery Time Test Circuit**



# NDBA170N06A



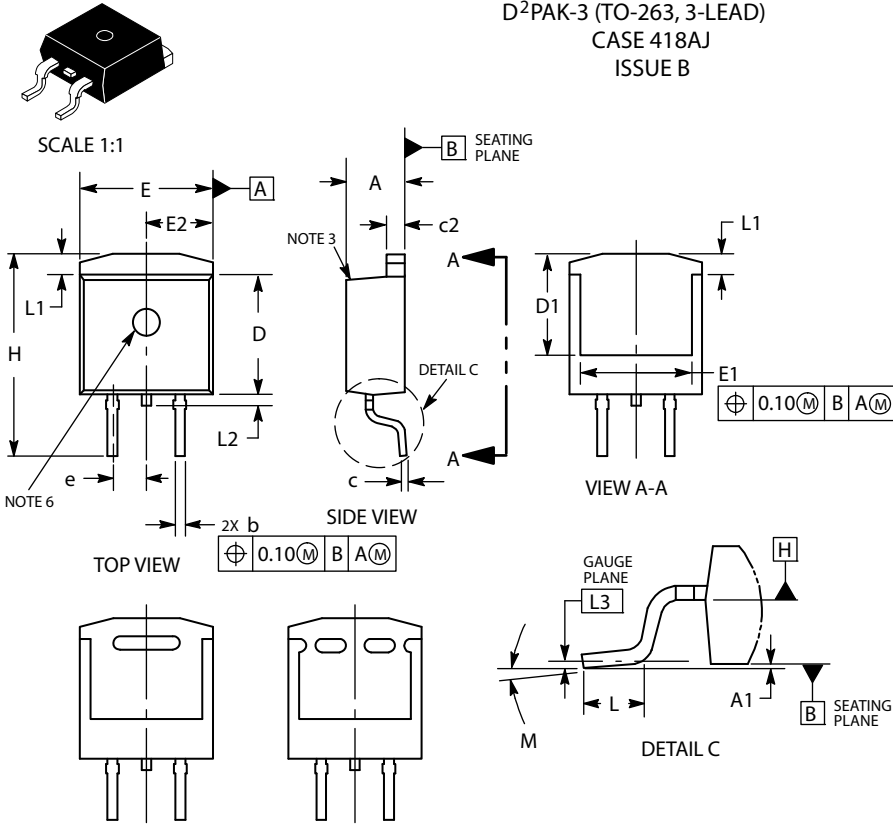
# NDBA170N06A



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## PACKAGE DIMENSIONS

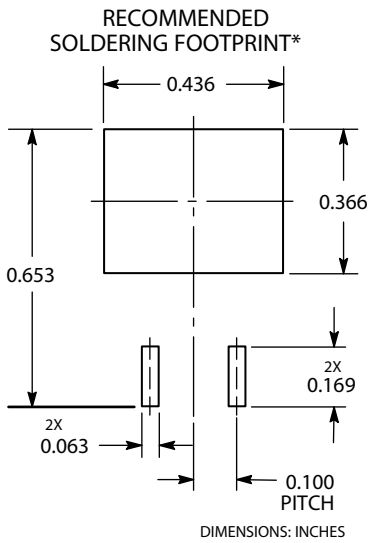
D<sup>2</sup>PAK-3 (TO-263, 3-LEAD)  
CASE 418AJ  
ISSUE B



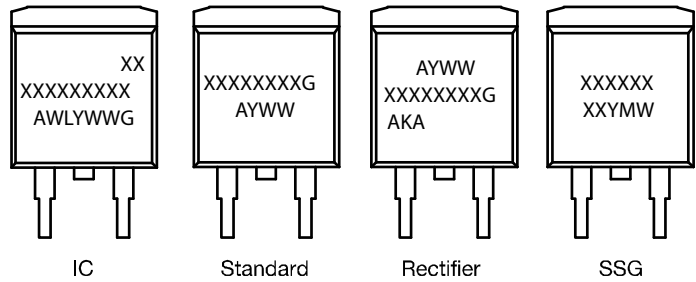
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: INCHES.
  3. CHAMFER OPTIONAL.
  4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.005 PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
  5. THERMAL PAD CONTOUR IS OPTIONAL WITHIN DIMENSIONS E, L1, D1 AND E1.
  6. OPTIONAL MOLD FEATURE

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.160	0.190	4.06	4.83
A1	0.000	0.010	0.00	0.25
b	0.020	0.039	0.51	0.99
c	0.012	0.029	0.30	0.74
c2	0.045	0.065	1.14	1.65
D	0.330	0.380	8.38	9.65
D1	0.260	-----	6.60	-----
E	0.380	0.420	9.65	10.67
E1	0.245	-----	6.22	-----
e	0.100 BSC		2.54 BSC	
H	0.575	0.625	14.60	15.88
L	0.070	0.110	1.78	2.79
L1	-----	0.066	-----	1.68
L2	-----	0.070	-----	1.78
L3	0.010 BSC		0.25 BSC	
M	0°	8°	0°	8°

VIEW A-A  
OPTIONAL CONSTRUCTIONS



### GENERIC MARKING DIAGRAMS\*



- XXXXXX = Specific Device Code
- A = Assembly Location
- WL = Wafer Lot
- Y = Year
- WW = Work Week
- W = Week Code (SSG)
- M = Month Code (SSG)
- G = Pb-Free Package
- AKA = Polarity Indicator

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

Note on usage : Since the NDBA170N06A is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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