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NTMTS001N06C

Power MOSFET
60 V, 0.91 mΩ, 376 A, Single N−Channel

Features

- Small Footprint (8x8 mm) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- Power Tools, Battery Operated Vacuums
- UAV/Drones, Material Handling
- BMS/Storage, Home Automation

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain−to−Source Voltage		V_{DSS}	60	V
Gate−to−Source Voltage		V_{GS}	±20	V
Continuous Drain Current $R_{\theta JC}$ (Note 2)	T_C = 25°C	I_D	376	A
	T_C = 100°C		266	
Power Dissipation $R_{\theta JC}$ (Note 2)	T_C = 25°C	P_D	244.0	W
	T_C = 100°C		122.0	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	T_A = 25°C	I_D	53.7	A
	T_A = 100°C		38.0	
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)	T_A = 25°C	P_D	5.0	W
	T_A = 100°C		2.5	
Pulsed Drain Current	T_A = 25°C, t_p = 10 µs	I_{DM}	900	A
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)		I_S	203.4	A
Single Pulse Drain−to−Source Avalanche Energy ($I_{L(pk)}$ = 30 A)		E_{AS}	887	mJ
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)		T_L	260	°C

Note: "Steady State" spans the Continuous Drain Current and Power Dissipation rows for both $R_{\theta JC}$ and $R_{\theta JA}$ groups.

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS

| Parameter	Symbol	Value	Unit
Junction−to−Case − Steady State (Note 2)	$R_{\theta JC}$	0.614	°C/W
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	30.10	

1. Surface−mounted on FR4 board using a 1 in² pad size, 1 oz. Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

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$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
60 V	0.91 mΩ @ 10 V	376 A

D (5−8)

G (1)

S (2−4)

N−CHANNEL MOSFET

Top   POFN88   Bottom
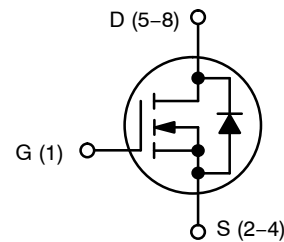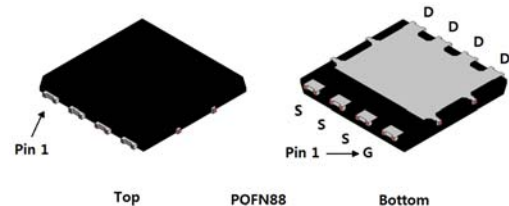
POWER 88
CASE 507AP

MARKING DIAGRAM

XXXXXXXX
AWLYWW
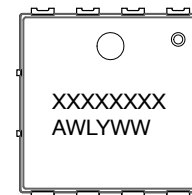
XXX = Device Code
      (8 A−N characters max)
A   = Assembly Location
WL = 2−digit Wafer Lot Code
Y   = Year Code
WW = Work Week Code

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		60			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 250 μA, ref to 25°C			22		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 60 V	T_J = 25°C			10	μA
			T_J = 125°C			250	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = 20 V				100	nA
ON CHARACTERISTICS (Note 3)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		2.0		4.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	I_D = 250 μA, ref to 25°C			−7.75		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 50 A		0.77	0.91	mΩ
Forward Transconductance	g_{FS}	V_{DS} =5 V, I_D = 50 A			160		S
Gate Resistance	R_G	T_A = 25°C			1.5		Ω
CHARGES, CAPACITANCES & GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 30 V			8705		pF
Output Capacitance	C_{OSS}				6690		
Reverse Transfer Capacitance	C_{RSS}				107		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 30 V; I_D = 50 A			113		nC
Threshold Gate Charge	$Q_{G(TH)}$				19.5		
Gate−to−Source Charge	Q_{GS}				31.2		
Gate−to−Drain Charge	Q_{GD}				16.3		
Voltage Plateau	V_{GP}	V_{GS} = 10 V, V_{DS} = 30 V; I_D = 50 A			4.01		V
SWITCHING CHARACTERISTICS, V_{GS} = 10 V (Note 4)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DS} = 30 V, I_D = 50 A, R_G = 2.5 Ω			27.4		ns
Rise Time	t_r				21.4		
Turn−Off Delay Time	$t_{d(OFF)}$				58.3		
Fall Time	t_f				14.5		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 50 A	T_J = 25°C		0.78	1.2	V
			T_J = 125°C		0.63		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dIS/dt = 100 A/μs, I_S = 50 A			100		ns
Charge Time	t_a				66.3		
Discharge Time	t_b				43.7		
Reverse Recovery Charge	Q_{RR}				236		nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
3. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
4. Switching characteristics are independent of operating junction temperatures.

NTMTS001N06C

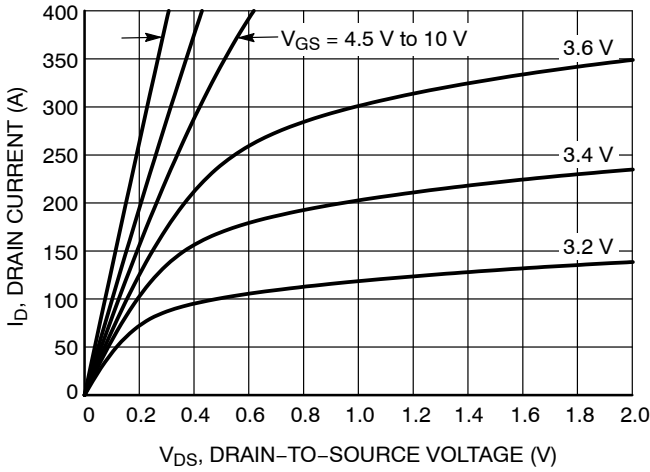## TYPICAL CHARACTERISTICS

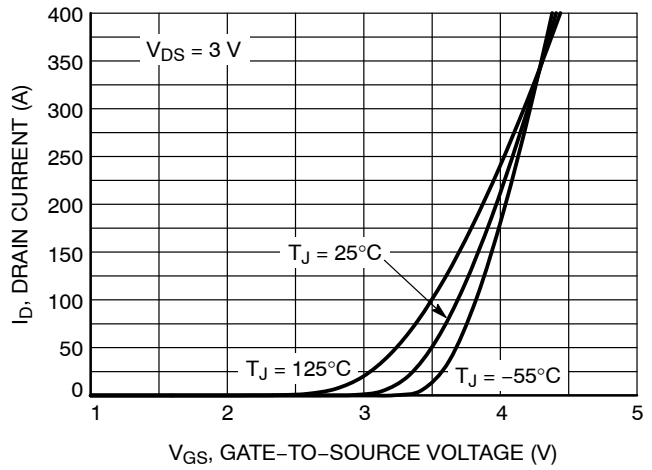Figure 1. On−Region Characteristics
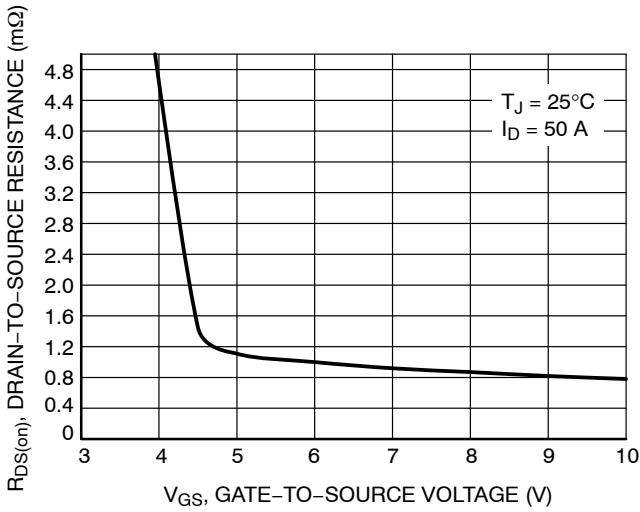

Figure 2. Transfer Characteristics

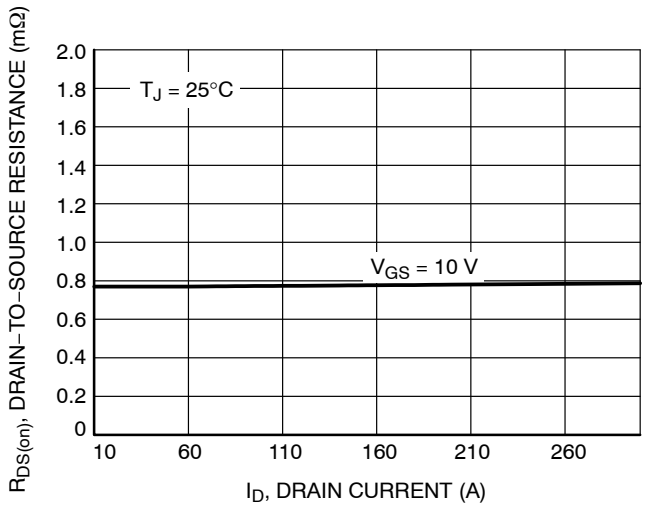Figure 3. On−Resistance vs. Gate−to−Source
Voltage

Figure 4. On−Resistance vs. Drain Current and
Gate Voltage
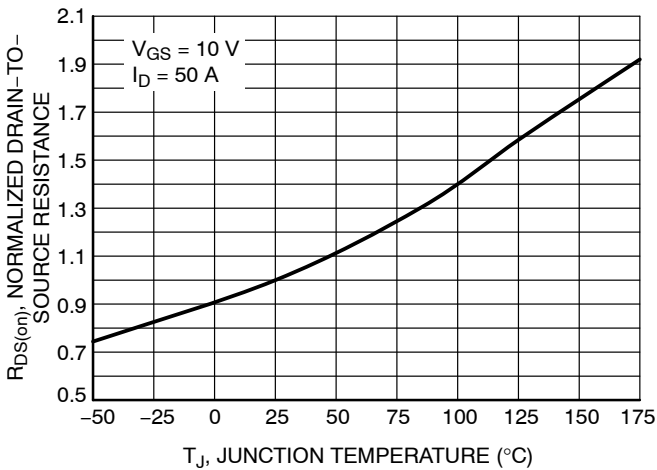

Figure 5. On−Resistance Variation with
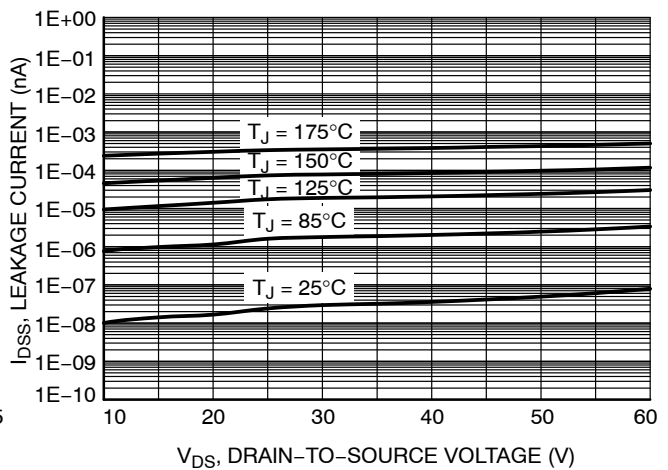Temperature

Figure 6. Drain−to−Source Leakage Current
vs. Voltage

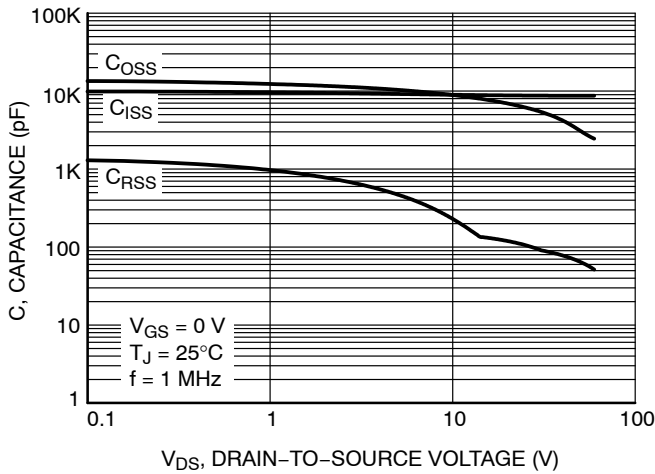# NTMTS001N06C

TYPICAL CHARACTERISTICS
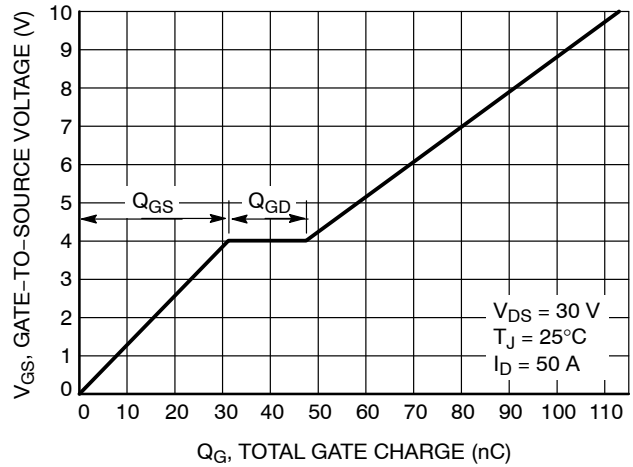

Figure 7. Capacitance Variation

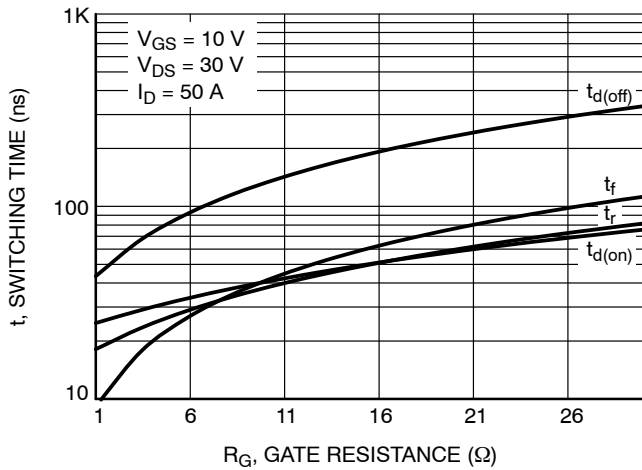Figure 8. Gate−to−Source Voltage vs. Total Charge

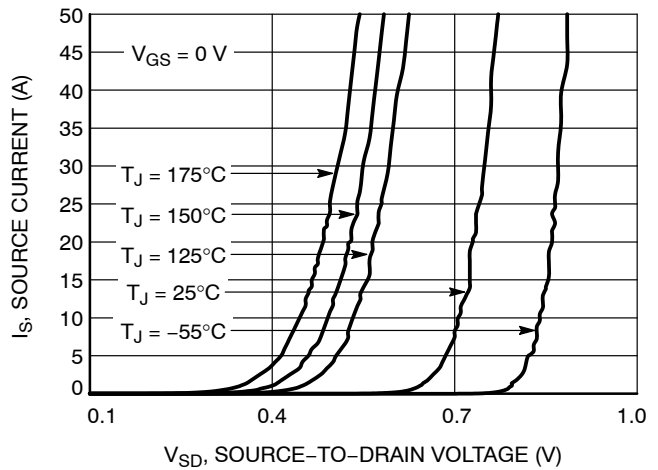Figure 9. Resistive Switching Time Variation vs. Gate Resistance

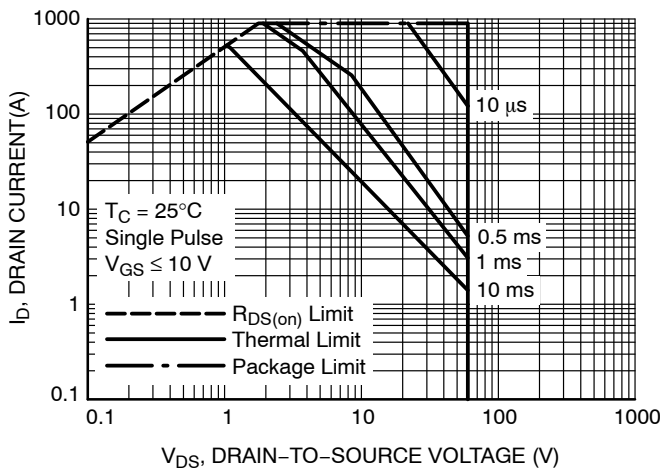Figure 10. Diode Forward Voltage vs. Current

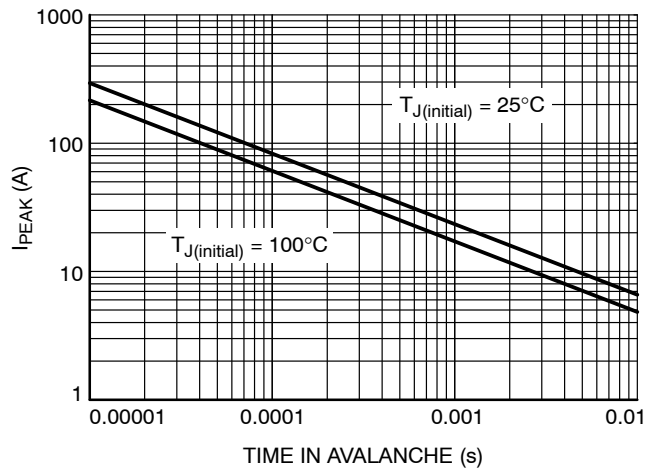Figure 11. Maximum Rated Forward Biased Safe Operating Area

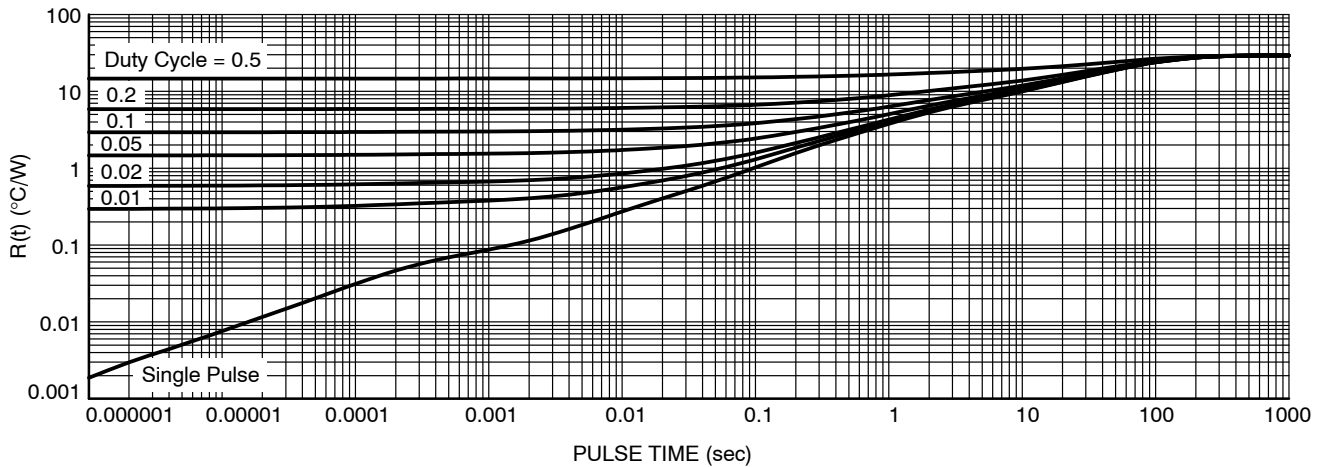Figure 12. I_{PEAK} vs. Time in Avalanche

TYPICAL CHARACTERISTICS

Figure 13. Thermal Characteristics

DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping[†]
NTMTS001N06CTXG	001N06C	POWER 88 (Pb−Free)	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PACKAGE DIMENSIONS

DFNW8 8.3x8.4, 2P
CASE 507AP
ISSUE O

0.20 C

D

D1

B

8   5

A

E   E1

EJECTOR
PIN MARK

0.20 C

1   4

PIN 1
AREA

TOP VIEW

Θ

c

A1

C

DETAIL A
SCALE: 2X

// 0.10 C

0.10 C

A

SEE DETAIL A   FRONT VIEW

D3

D2

0.10 M C A B

5   b1 (8X)   8

L1

E3 (4X)

E2

e1

e1/2

0.10 M C A B

K

L

4   e   1   b (8X)

e/2

0.10 M C A B
.05 M C

BOTTOM VIEW

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. COPLANARITY APPLIES TO THE EXPOSED PADS AS
   WELL AS THE TERMINALS.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH,
   PROTRUSIONS, OR GATE BURRS.
5. SEATING PLANE IS DEFINED BY THE TERMINALS.
   "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING
   PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	1.00	1.10	1.20
A1	0.00	---	0.05
b	0.90	1.00	1.10
b1	0.43	0.53	0.63
c	0.23	0.28	0.33
D	8.20	8.30	8.40
D1	7.90	8.00	8.10
D2	6.80	6.90	7.00
D3	6.90	7.00	7.10
E	8.30	8.40	8.50
E1	7.80	7.90	8.00
E2	5.24	5.34	5.44
E3	0.25	0.35	0.45
e	2.00 BSC		
e/2	1.00 BSC		
e1	2.70 BSC		
e1/2	1.35 BSC		
K	1.50	1.57	1.70
L	0.64	0.74	0.84
L1	0.67	0.77	0.87
Θ	0°	---	12°

8.10

7.00

8   5

KEEP OUT
AREA

1.33

1.15

9.42

5.50   6.65

1.50

1.28

1   4

1.25
(8X)   2.00

RECOMMENDED LAND PATTERN

NTMTS001N06C

PUBLICATION ORDERING INFORMATION