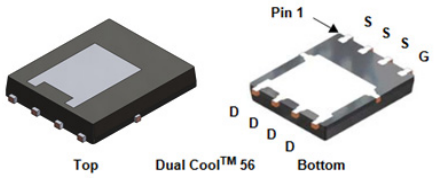
MOSFET – Power, Single N-Channel, DUAL COOL®

40 V, 0.78 mΩ, 310 A

NTMFSC0D8N04XM

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
40 V	0.78 mΩ @ 10 V	310 A



DFN8 5x6
CASE 506EG

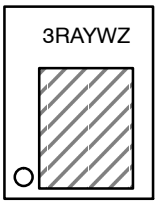
Features

- Dual Sided Cooling Package
- Latest 40 V Power MOSFET Technology for Motor Drive Applications
- Extreme Lower On-Resistance to Minimize Conduction Losses
- Lower Gate Charge to Minimize Gate Driving and Switching Losses
- Soft Body Diode Reverse Recovery
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant

Applications

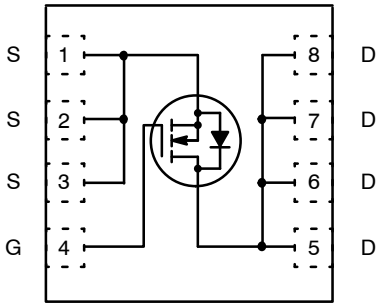
- Motor Drive
- ORing FET
- Battery Protection

MARKING DIAGRAM



3R = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
Z = Assembly Lot Code

N-Channel MOSFET



ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

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

Symbol	Parameter		Value	Unit
V_{DSS}	Drain-to-Source Voltage		40	V
V_{GS}	Gate-to-Source Voltage	DC	±20	V
I_D	Continuous Drain Current (Note 2)	T_C = 25 °C	310	A
		T_C = 100 °C	219	
P_D	Power Dissipation (Note 2)	T_C = 25 °C	135	W
I_{DM}	Pulsed Drain Current	T_C = 25 °C, t_p = 10 μs	1463	A
T_J, T_{stg}	Operating Junction and Storage Temperature Range		−55 to +175	°C
I_S	Continuous Source-Drain Current (Body Diode)		150	A
E_{AS}	Single Pulse Avalanche Energy (I_{PK} = 69 A)		248	mJ
T_L	Lead Temperature Soldering Purposes (1/8″ from case for 10 s)		260	°C

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.

1. Surface-mounted on FR4 board using 1 in^2 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.

THERMAL CHARACTERISTICS

Symbol	Parameter	Max	Unit
$R_{\theta JC}$	Junction-to-Case (Bottom) – Steady State (Note 2)	1.1	°C/W
$R_{\theta JC}$	Junction-to-Case (Top) – Steady State (Note 2)	1.7	
$R_{\theta JA}$	Junction-to-Ambient – Steady State (Notes 1, 2)	39	

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 1 mA	40			V
$\Delta V_{(BR)DSS}/\Delta T_J$	Drain-to-Source Breakdown Voltage Temperature Coefficient	I_D = 1 mA, Referenced to 25 °C		15		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 40 V, T_J = 25 °C			10	μA
		V_{DS} = 40 V, T_J = 125 °C			100	
I_{GSS}	Gate-to-Source Leakage Current	V_{DS} = 0 V, V_{GS} = 20 V			100	nA
ON CHARACTERISTICS (Note 3)						
$R_{DS(on)}$	Drain-to-Source On Resistance	V_{GS} = 10 V, I_D = 50 A		0.63	0.78	mΩ
		V_{GS} = 7 V, I_D = 50 A		0.86	1.25	
$V_{GS(TH)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 180 μA	2.5	3.0	3.5	V
$\Delta V_{GS(TH)}/\Delta T_J$	Gate Threshold Voltage Temperature Coefficient	V_{GS} = V_{DS}, I_D = 180 μA		−7		mV/°C
g_{FS}	Forward Trans-conductance	V_{DS} = 5 V, I_D = 50 A		244		S
CHARGES & CAPACITANCES						
C_{ISS}	Input Capacitance	V_{GS} = 0 V, V_{DS} = 20 V, f = 1 MHz		4651		pF
C_{OSS}	Output Capacitance			3319		
C_{RSS}	Reverse Transfer Capacitance			69		
Q_{OSS}	Output Charge			100		nC
$Q_{G(TOT)}$	Total Gate Charge	V_{GS} = 10 V, V_{DD} = 20 V, I_D = 50 A		72		
$Q_{G(TH)}$	Threshold Gate Charge			14		
Q_{GS}	Gate-to-Source Charge			21		
Q_{GD}	Gate-to-Drain Charge			13		
V_{GP}	Gate Plateau Voltage			4.5		V
R_G	Gate Resistance	f = 1 MHz		0.65	1.2	Ω
SWITCHING CHARACTERISTICS (Note 3)						
$t_{d(ON)}$	Turn-On Delay Time	Resistive Load V_{GS} = 0/10 V, V_{DD} = 20 V, I_D = 50 A, R_G = 2.5 Ω		28		ns
t_r	Rise Time			10		
$t_{d(OFF)}$	Turn-Off Delay Time			45		
t_f	Fall Time			9.5		
SOURCE−TO−DRAIN DIODE CHARACTERISTICS						
V_{SD}	Forward Diode Voltage	V_{GS} = 0 V, I_S = 50 A, T_J = 25 °C		0.81	1.2	V
		V_{GS} = 0 V, I_S = 50 A, T_J = 125 °C		0.66	1.0	
t_{RR}	Reverse Recovery Time	V_{GS} = 0 V, dI_S/dt = 100 A/μs, I_S = 50 A, V_{DD} = 50 V		69		ns
t_a	Charge Time			36		
t_b	Discharge Time			33		
Q_{RR}	Reverse Recovery Charge			144		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. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

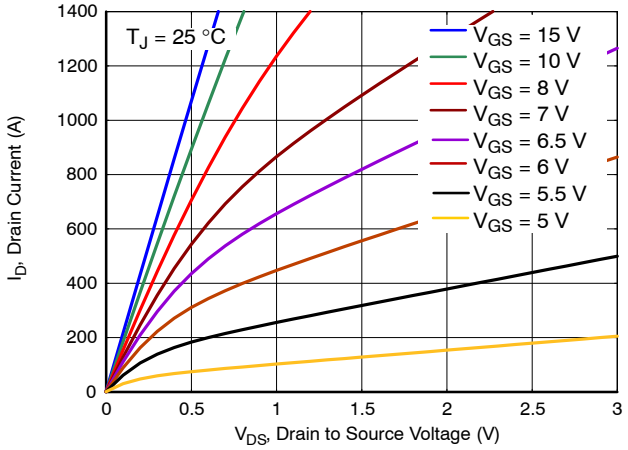


Figure 1. On-Region Characteristics

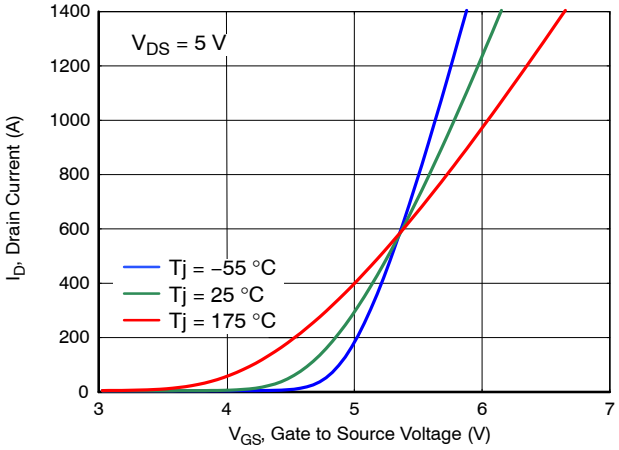


Figure 2. Transfer Characteristics

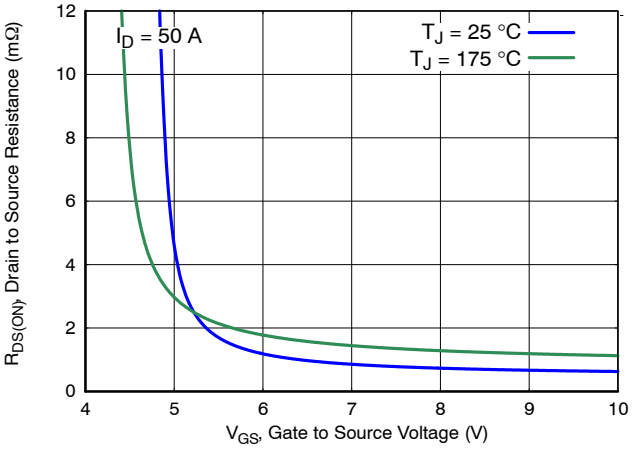


Figure 3. On-Resistance vs. Gate Voltage

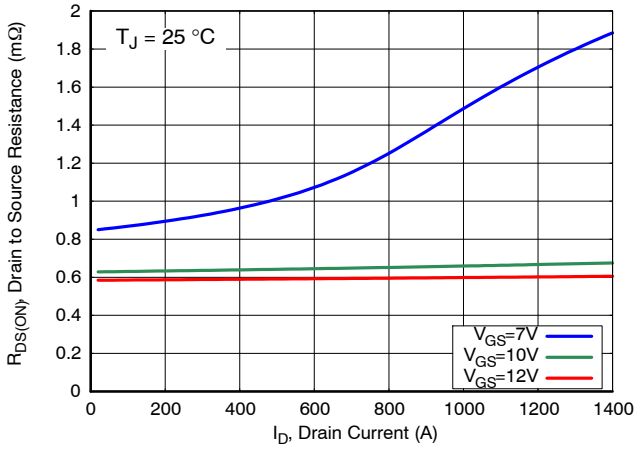


Figure 4. On-Resistance vs. Drain Current

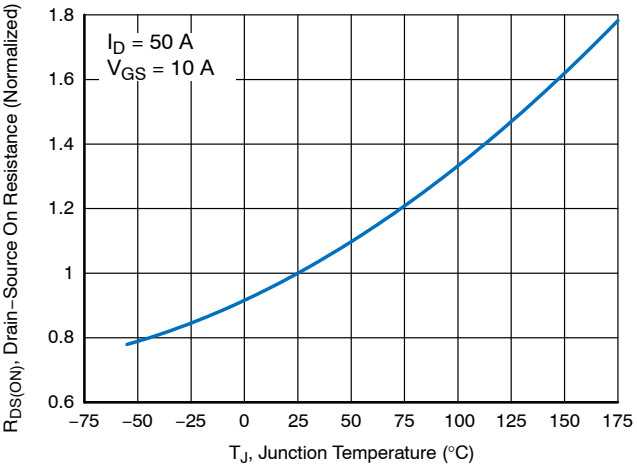


Figure 5. Normalized ON Resistance vs. Junction Temperature

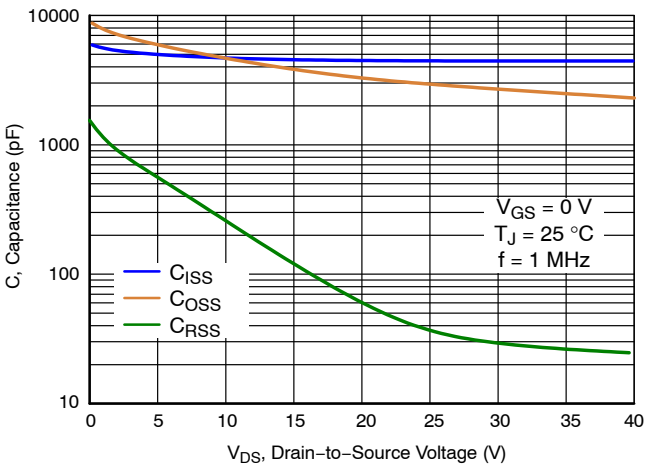


Figure 6. Capacitance Characteristics

TYPICAL CHARACTERISTICS

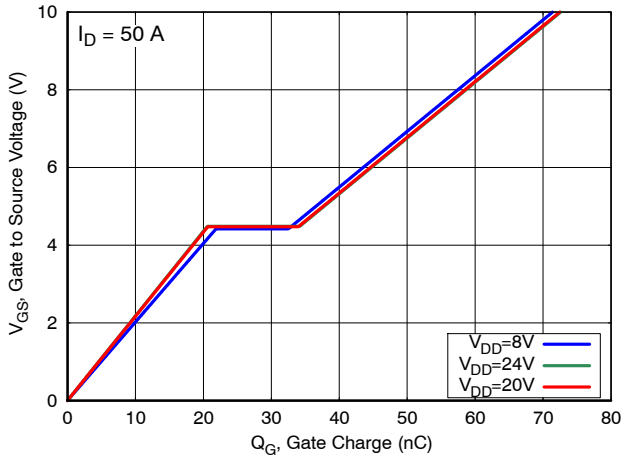


Figure 7. Gate Charge Characteristics

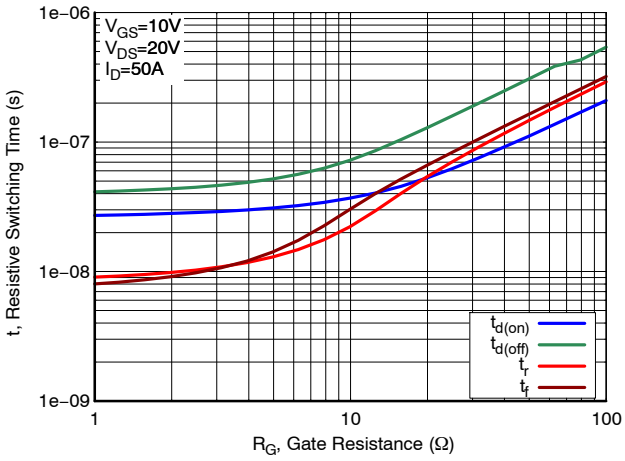


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

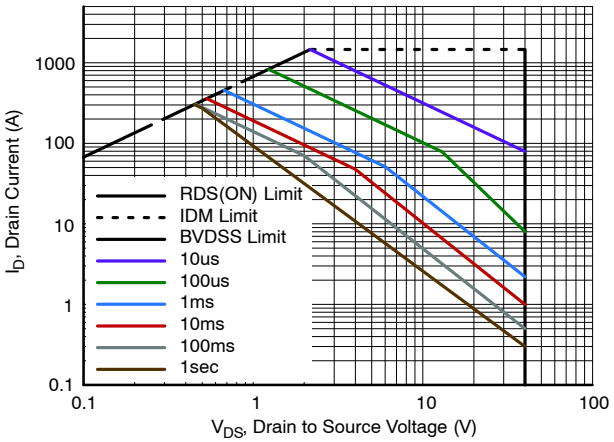


Figure 9. Safe Operating Area (SOA)

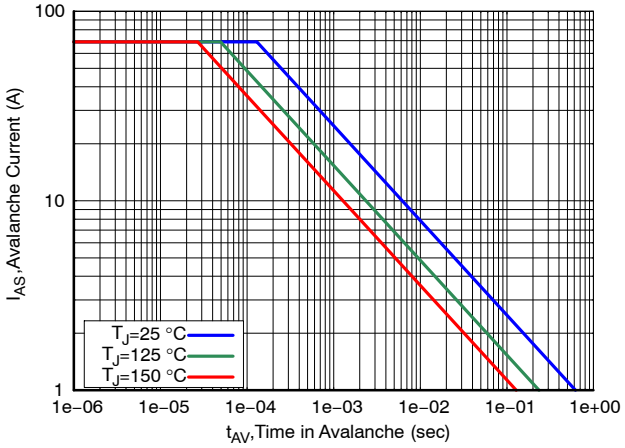


Figure 10. Avalanche Current vs Pulse Time (UIS)

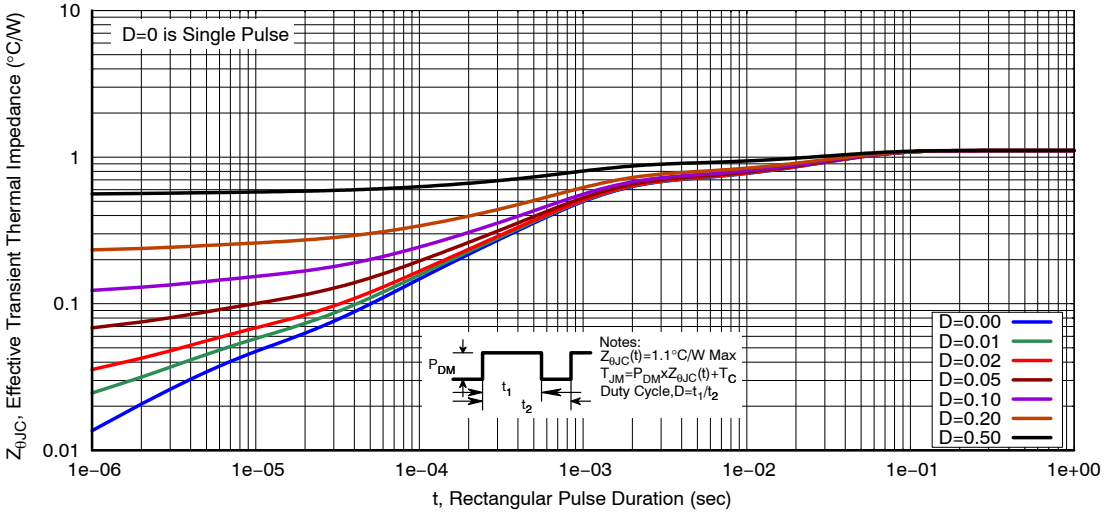


Figure 11. Transient Thermal Response

ORDERING INFORMATION

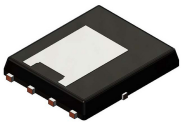
Device	Device Marking	Package	Shipping†
NTMFSC0D8N04XMTWG	3R	DFN8 5x6 (Pb-Free/Halogen Free)	3,000 / Tape & Reel

† 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.

REVISION HISTORY

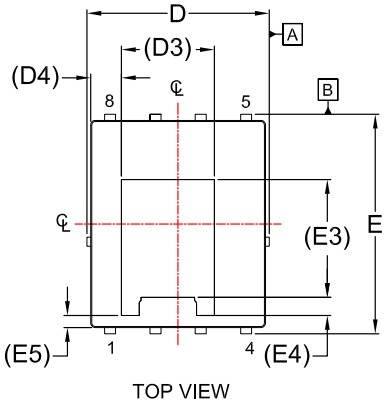
Revision	Description of Changes	Date
2	Revision to add figure in the existing datasheet.	8/27/2025
3	Added Figure 5 (Normalized ON Resistance vs. Junction Temperature)	5/25/2025

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.



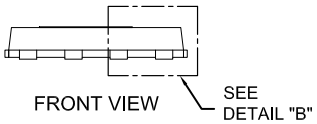
DFN8 5x6.15, 1.27P, DUAL COOL
CASE 506EG
ISSUE D

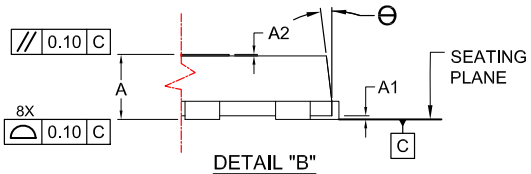
DATE 25 AUG 2020

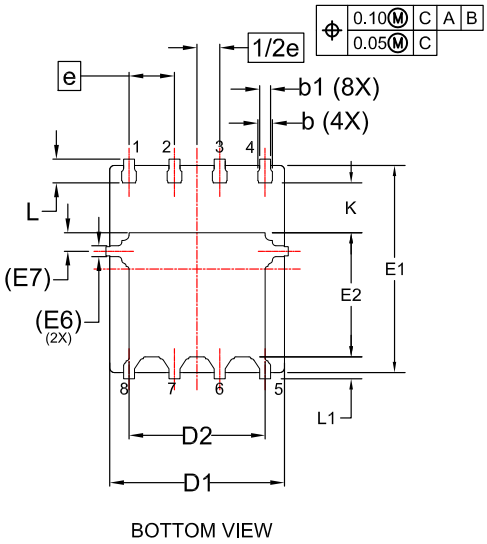


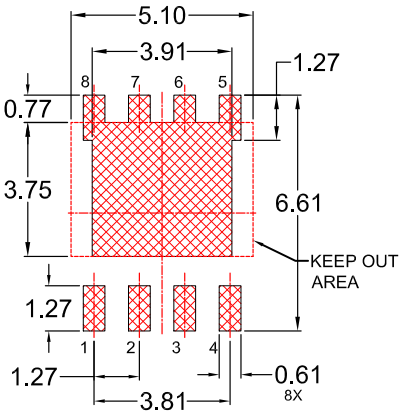
NOTES:

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.





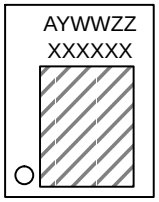




*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.85	0.90	0.95
A1	-	-	0.05
A2	-	-	0.05
b	0.31	0.41	0.51
b1	0.21	0.31	0.41
c	0.20	0.25	0.30
D	4.90	5.00	5.10
D1	4.80	4.90	5.00
D2	3.67	3.82	3.97
D3	2.60 REF		
D4	0.86 REF		
E	6.05	6.15	6.25
E1	5.70	5.80	5.90
E2	3.38	3.48	3.58
E3	3.30 REF		
E4	0.50 REF		
E5	0.34 REF		
E6	0.30 REF		
E7	0.52 REF		
e	1.27 BSC		
1/2e	0.635 BSC		
K	1.30	1.40	1.50
L	0.56	0.66	0.76
L1	0.52	0.62	0.72
Θ	0°	---	12°

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

*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. Some products may not follow the Generic Marking.

DOCUMENT NUMBER:	**98AON84257G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**DFN8 5x6.15, 1.27P, DUAL COOL**	**PAGE 1 OF 1**

ADDITIONAL INFORMATION

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