



40V 175°C N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV _{DSS}	R _{DS(ON)} max	I _D T _C = +25°C (Note 9)
40V	$3m\Omega$ @ $V_{GS} = 10V$	100A

Description and Applications

This MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Engine Management Systems
- Body Control Electronics
- DC-DC Converters

Features

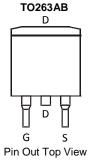
- Rated to +175°C Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching Ensures More Reliable and Robust End Application
- Low R_{DS(ON)} Minimizes Power Losses
- Low Q_g Minimizes Switching Losses
- Lead-Free Finish; RoHS compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- An Automotive-Compliant Part is Available Under Separate Datasheet (<u>DMTH4004SCTBQ</u>)

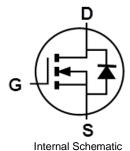
Mechanical Data

- Case: TO263AB
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish Matte Tin Annealed over Copper Leadframe.
 Solderable per MIL-STD-202, Method 208 ³
- Weight: 1.4 grams (Approximate)



Top View





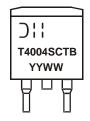
Ordering Information (Note 4)

Part Number	Case	Packaging
DMTH4004SCTB-13	TO263AB	800 / Tape & Reel

Notes:

- 1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
- See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
- 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- 4. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



T4004SCTB = Product Type Marking Code YYWW = Date Code Marking YY = Last Two Digits of Year (ex: 14 = 2014) WW = Week (01 to 53)



Maximum Ratings (@ $T_A = +25^{\circ}C$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V_{DSS}	40	V	
Gate-Source Voltage	V_{GSS}	±20	V	
Continuous Drain Current (Note 6)	T _C = +25°C (Note 9)	I _D	100	А
, ,	$T_{\rm C} = +100^{\circ}{\rm C}$		100	
Maximum Continuous Body Diode Forward Current	Is	100	Α	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	200	Α	
Avalanche Current, L=0.2mH	I _{AS}	45	Α	
Avalanche Energy, L=0.2mH	E _{AS}	200	mJ	

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T _A = +25°C	P_D	4.7	W
Thermal Resistance, Junction to Ambient (Note 5)		$R_{ heta JA}$	32	°C/W
Total Power Dissipation (Note 6)	T _C = +25°C	P _D	136	W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	1.1	°C/W
Operating and Storage Temperature Range		T _{J,} T _{STG}	-55 to +175	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 7)							
Drain-Source Breakdown Voltage	BV_{DSS}	40	_	_	V	$V_{GS} = 0V$, $I_D = 1mA$	
Zero Gate Voltage Drain Current	I _{DSS}	_	_	1	μΑ	$V_{DS} = 32V, V_{GS} = 0V$	
Gate-Source Leakage	I _{GSS}	_	_	±100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 7)						·	
Gate Threshold Voltage	V _{GS(TH)}	2	_	4	V	$V_{DS} = V_{GS}$, $I_D = 250\mu A$	
Static Drain-Source On-Resistance	R _{DS(ON)}	-	2.5	3	mΩ	$V_{GS} = 10V, I_D = 100A$	
Diode Forward Voltage	V_{SD}	_	_	1.3	V	$V_{GS} = 0V, I_{S} = 100A$	
DYNAMIC CHARACTERISTICS (Note 8)						·	
Input Capacitance	C _{iss}	-	4305	_		$V_{DS} = 25V$, $V_{GS} = 0V$ f = 1MHz	
Output Capacitance	Coss	_	1441	_	pF		
Reverse Transfer Capacitance	C _{rss}	_	102	_			
Gate Resistance	Rg	_	0.77	_	Ω	$V_{DS} = 0V$, $V_{GS} = 0V$, $f = 1MHz$	
Total Gate Charge	Qg	_	68.6	_		$V_{DD} = 20V, I_D = 90A,$ $V_{GS} = 10V$	
Gate-Source Charge	Q _{gs}	_	16.8	_	nC		
Gate-Drain Charge	Q _{gd}	_	14.2	_			
Turn-On Delay Time	t _{D(ON)}	_	9.5	_		$V_{DD} = 20V, V_{GS} = 10V,$ $I_{D} = 90A, R_{G} = 3.5\Omega$	
Turn-On Rise Time	t _R	_	6.7	_			
Turn-Off Delay Time	t _{D(OFF)}	_	26.4	_	ns		
Turn-Off Fall Time	t _F	_	8.1	_			
Reverse Recovery Time	t _{RR}	_	52.4	_	ns	I 500 di/dt 4000/	
Reverse Recovery Charge	Q_{RR}	_	78.2	_	nC	I _F = 50A, di/dt = 100A/μs	

Notes:

- 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 6. Device mounted on infinite heatsink and measured by thermal couple attached on bottom heasink of package.
 7. Short duration pulse test used to minimize self-heating effect.
 8. Guaranteed by design. Not subject to product testing.
 9. Package limited.



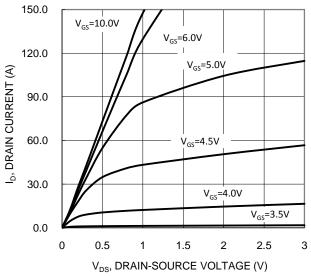


Figure 1. Typical Output Characteristic

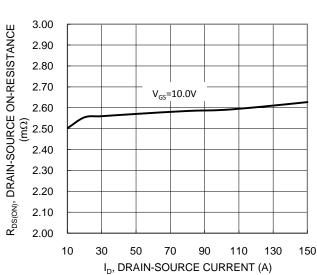


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

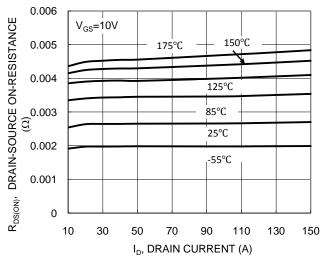


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

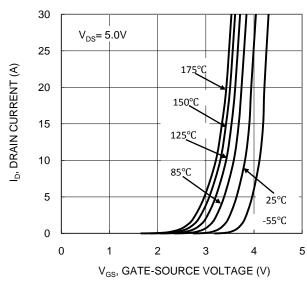


Figure 2. Typical Transfer Characteristic

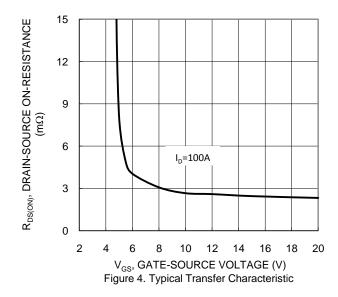
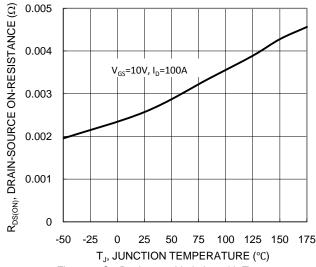


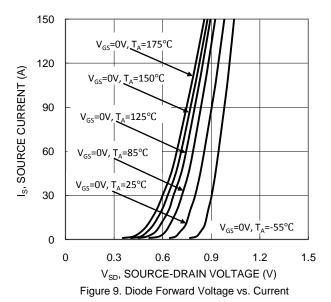
Figure 6. On-Resistance Variation with Temperature

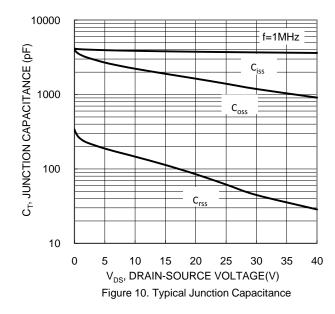


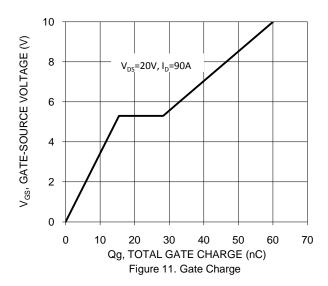


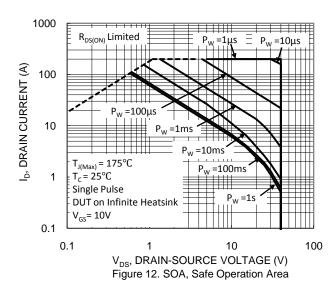
4 $V_{GS(TH)}$, GATE THRESHOLD VOLTAGE (V) 3.5 3 2.5 I_D=1mA 2 I_D=250μA 1.5 1 0.5 0 -50 -25 25 50 75 100 125 150 175 T₁, JUNCTION TEMPERATURE (°C)

Figure 7. On-Resistance Variation with Temperature Figure 8. Gate Threshold Variation vs. Temperature

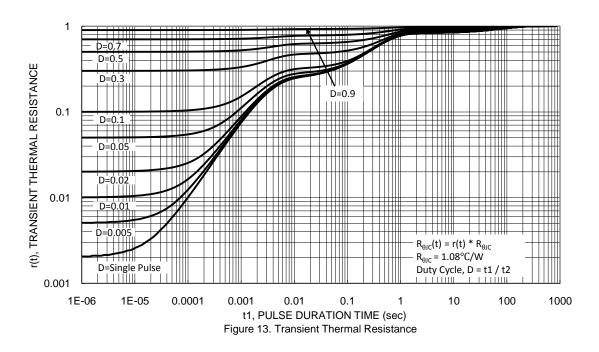






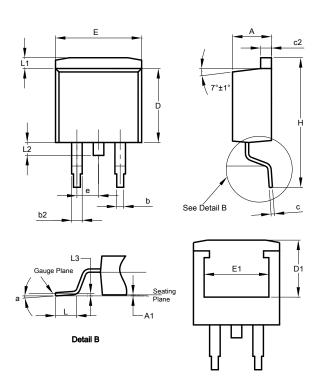






Package Outline Dimensions

Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.

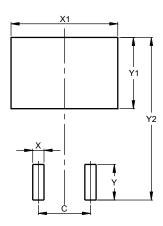


TO263AB (D2PAK)				
Dim	Min	Max	Тур	
Α	4.07	4.82	-	
A1	0.00	0.25	-	
b	0.51	0.99	-	
b2	1.15	1.77	-	
C	0.356	0.73	-	
c2	1.143	1.65	-	
D	8.39	9.65	-	
D1	6.55	6.95	-	
е	:	2.54 T\	/P	
Е	9.66	10.66	-	
E1	6.23	8.23	-	
Ŧ	14.61	15.87	-	
L	1.78	2.79	-	
L1	-	1.67	-	
L2	-	1.77	-	
L3	-	- 1	0.254	
а	0°	8°	-	
All Dimensions in mm				



Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
С	5.08
Х	1.10
X1	10.41
Y	3.50
Y1	7.01
Y2	15.99

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