100V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ max	I_D T_C = +25°C
100V	140mΩ @ V_{GS} = 10V	12A
	160mΩ @ V_{GS} = 4.5V	11A

Features

- Low On-Resistance
- Low Input Capacitance
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Available**

Description

This new generation MOSFET has been 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.

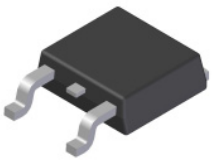
Mechanical Data

- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.33 grams (approximate)

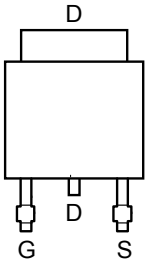
Applications

- DC-DC Converters
- Power management functions
- Analog Switch

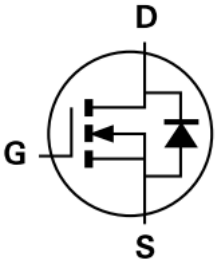
TO252



Top View



Top View



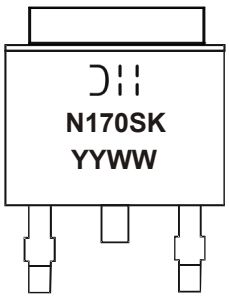
Internal Schematic

Ordering Information (Note 4 & 5)

Part Number	Compliance	Case	Packaging
DMN10H170SK3Q-13	Automotive	TO252	2,500/Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_grade_definitions/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



=Manufacturer's Marking
N170SK = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Digit of Year (ex: 14 = 2014)
WW = Week Code (01 to 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	100	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_C = +25°C T_C = +100°C	I_D	12 7.5	A
Maximum Body Diode Forward Current (Note 6)			I_S	4	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	16	A
Avalanche Current (Note 7)			I_{AR}	5.3	A
Avalanche Energy (Note 7)			E_{AR}	20	mJ

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	T_C = +25°C	P_D	42	W
	T_C = +100°C		17	
Thermal Resistance, Junction to Ambient (Note 6)		$R_{\theta JA}$	44	°C/W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	3	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	100	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 100V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	99	140	mΩ	V_{GS} = 10V, I_D = 5A
		—	104	160		V_{GS} = 4.5V, I_D = 5A
Diode Forward Voltage	V_{SD}	—	0.7	1.0	V	V_{GS} = 0V, I_S = 10A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1167	—	pF	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	36	—		
Reverse Transfer Capacitance	C_{rss}	—	25	—		
Gate Resistance	R_G	—	1.3	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	4.9	—	nC	V_{DS} = 80V, I_D = 12.8A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	9.7	—		
Gate-Source Charge	Q_{gs}	—	2.0	—		
Gate-Drain Charge	Q_{gd}	—	2.0	—		
Turn-On Delay Time	$t_{D(on)}$	—	10.5	—	ns	V_{DD} = 50V, R_G = 25Ω, I_D = 12.8A
Turn-On Rise Time	t_r	—	11.1	—		
Turn-Off Delay Time	$t_{D(off)}$	—	42.6	—		
Turn-Off Fall Time	t_f	—	12.8	—		
Body Diode Reverse Recovery Time	t_{rr}	—	30.3	—	ns	V_{GS} = 0V, I_S = 12.8A, dI/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{rr}	—	35.2	—	nC	V_{GS} = 0V, I_S = 12.8A, dI/dt = 100A/µs

Notes:
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout.
7. UIS in production with L = 1.43mH, TJ = +25°C.
8. Short duration pulse test used to minimize self-heating effect
9. Guaranteed by design; not subject to production testing

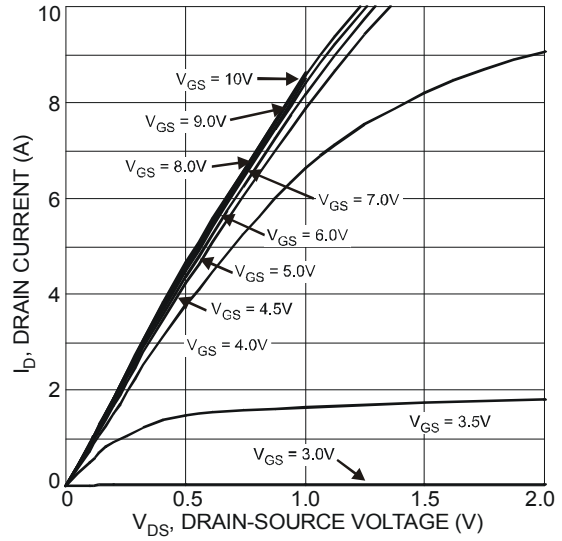


Fig.1 Typical Output Characteristic

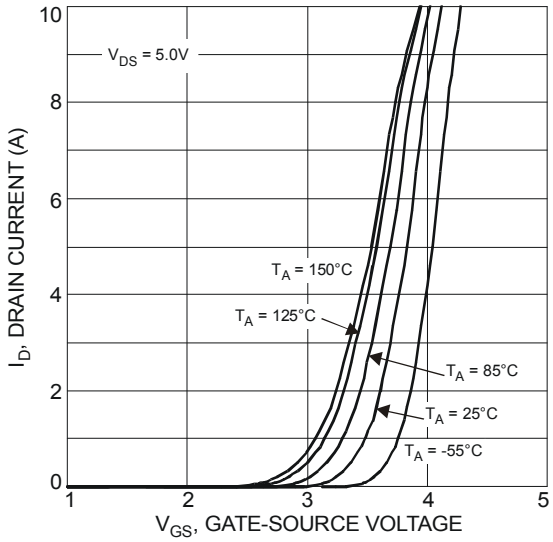


Fig.2 Typical Transfer Characteristics

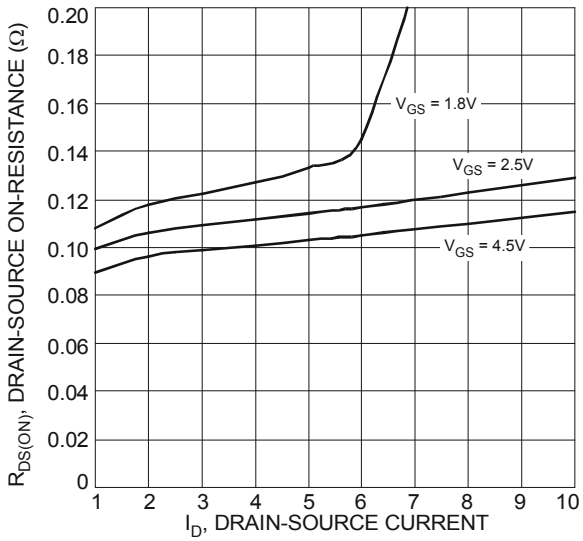


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

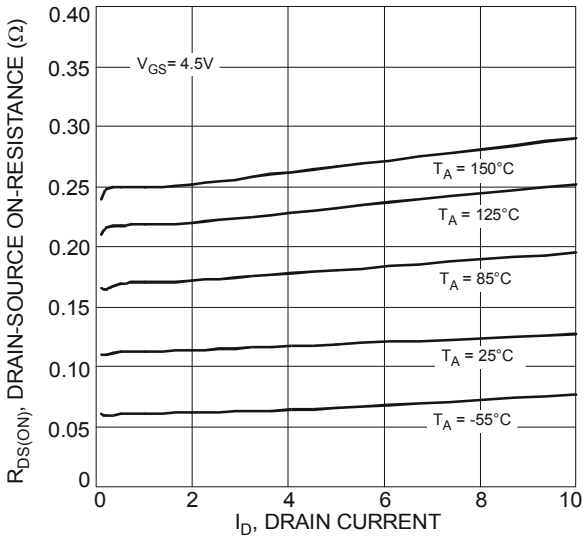


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

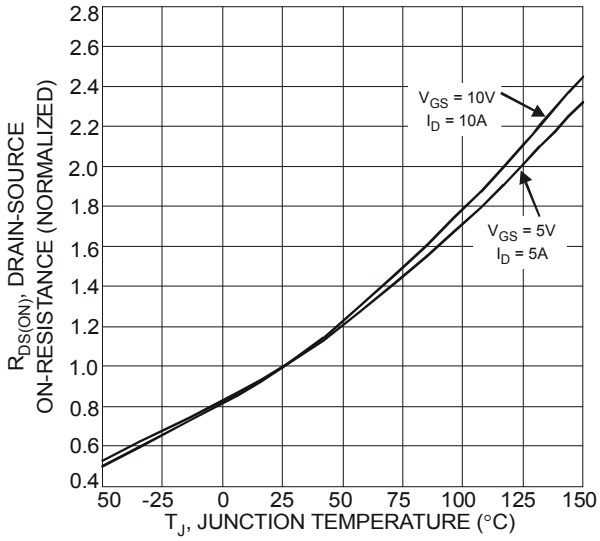


Fig. 5 On-Resistance Variation with Temperature

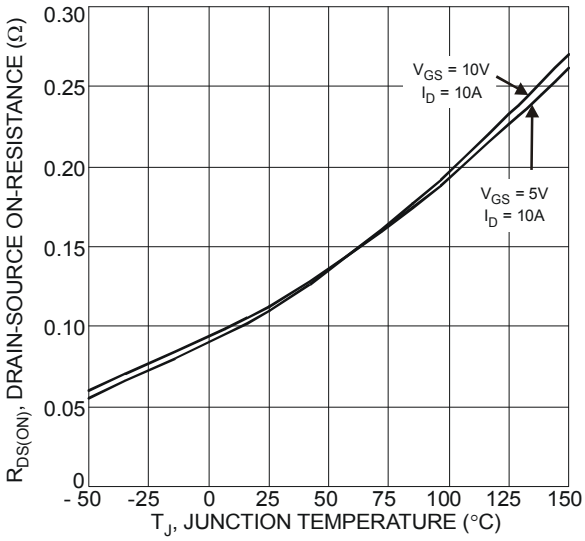


Fig. 6 On-Resistance Variation with Temperature

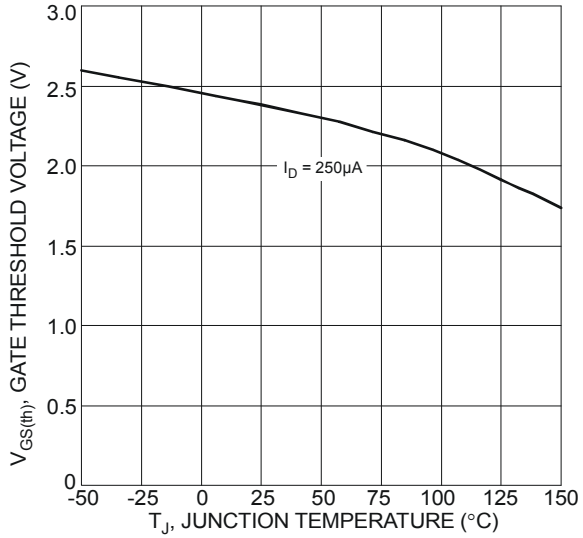


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

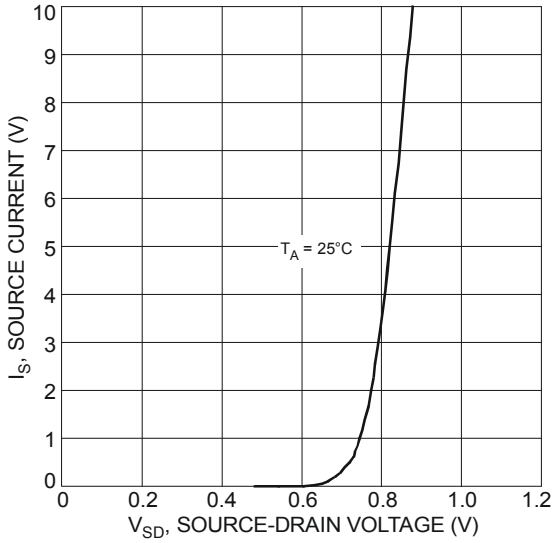


Fig.8 Diode Forward Voltage vs. Current

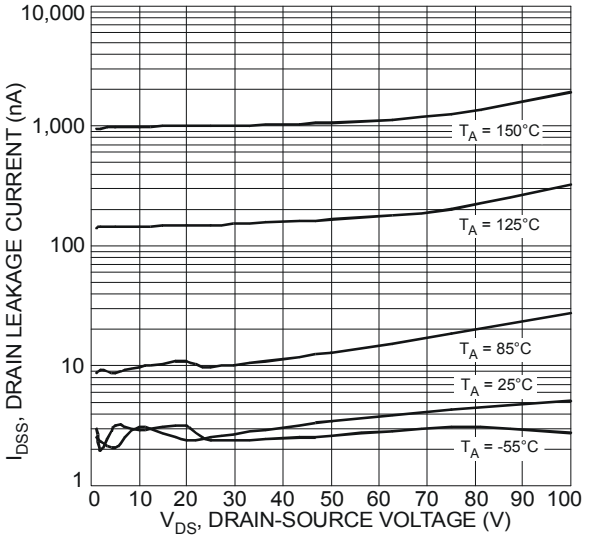


Fig. 9 Typical Drain-Source Leakage Current vs. Voltage

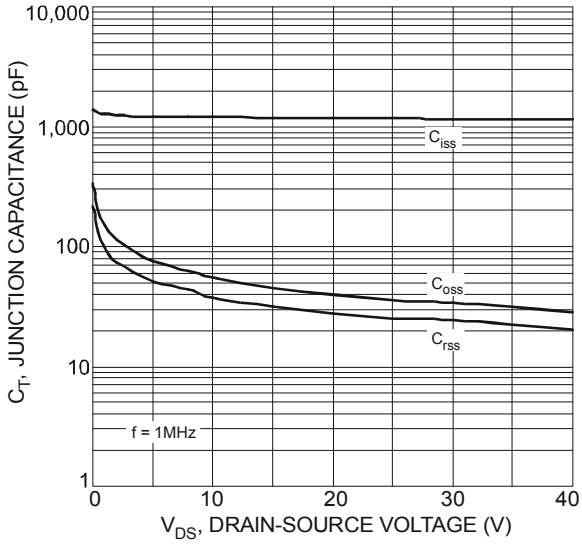


Fig. 10 Typical Junction Capacitance

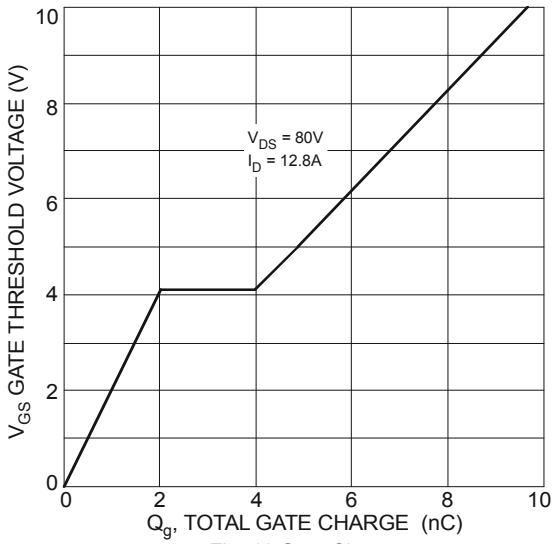
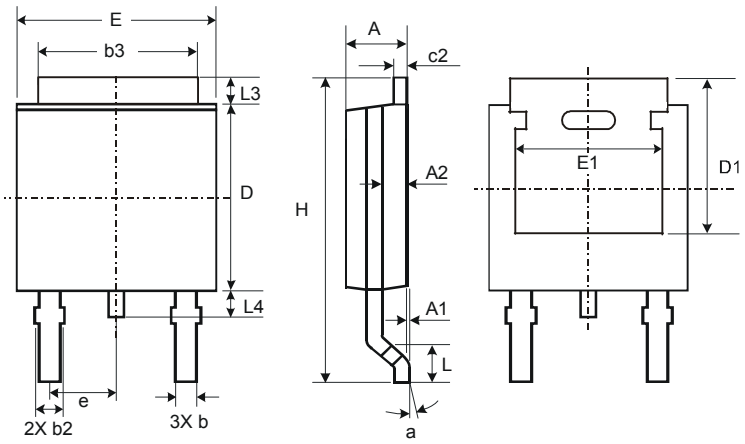


Fig. 11 Gate Charge

Package Outline Dimensions

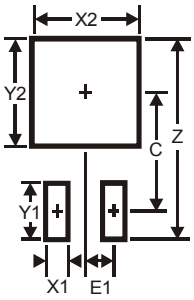
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



TO252			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c2	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	–	–
e	–	–	2.286
E	6.45	6.70	6.58
E1	4.32	–	–
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	–
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)
Z	11.6
X1	1.5
X2	7.0
Y1	2.5
Y2	7.0
C	6.9
E1	2.3

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