

Product Summary

BV _{DSS}	R _{DS(ON)} MAX	I _D T _C = +25°C
60V	40mΩ @ V _{GS} = 10V	20A
	58mΩ @ V _{GS} = 4.5V	16A

Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- DC-DC converters
- Power-management functions
- Backlighting

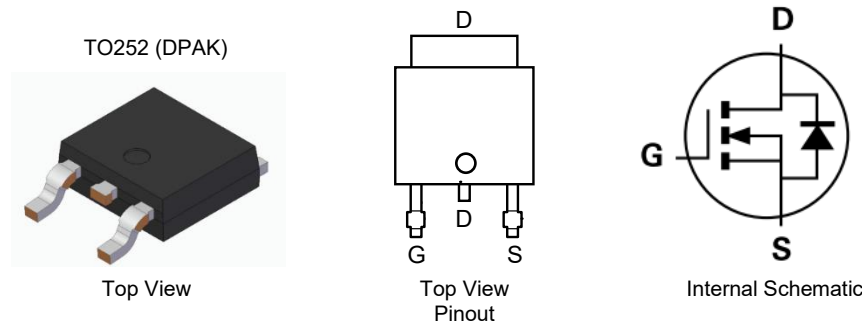
Features and Benefits

- Low Input Capacitance
- Low On-Resistance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMN6040SK3Q is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

Mechanical Data

- Package: TO252
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.33 grams (Approximate)

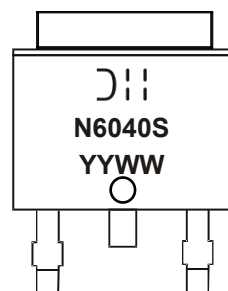


Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMN6040SK3Q-13	TO252 (DPAK)	2,500	Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



DII = Manufacturer's Marking
 N6040S = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 25 = 2025)
 WW = Week Code (01 to 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	60	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current (Note 5) V _{GS} = 10V	Steady State	T _C = +25°C	I _D	20	A
		T _C = +100°C		13	
Maximum Body Diode Forward Current (Note 5)			I _S	4	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I _{DM}	30	A
Avalanche Current (Note 6)			I _{AS}	14.2	A
Avalanche Energy (Note 6)			E _{AS}	10	mJ

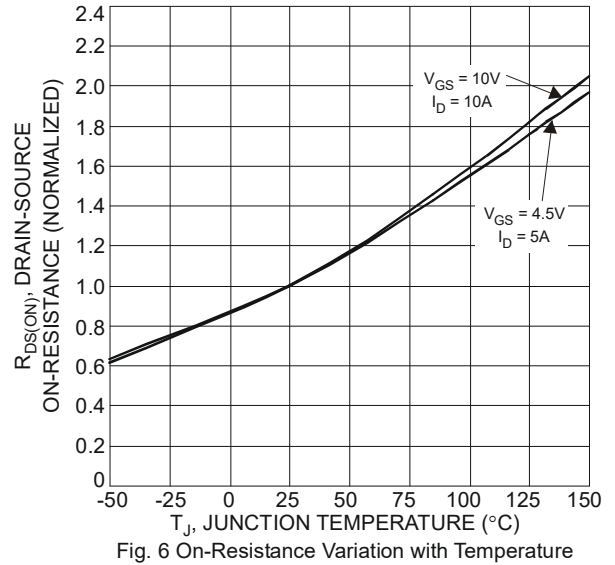
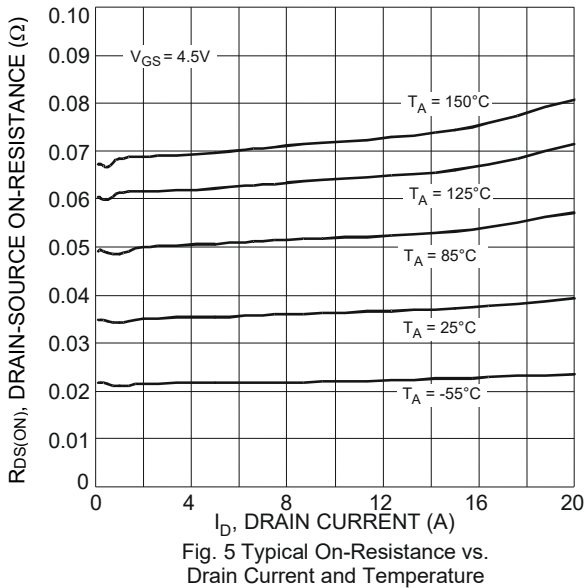
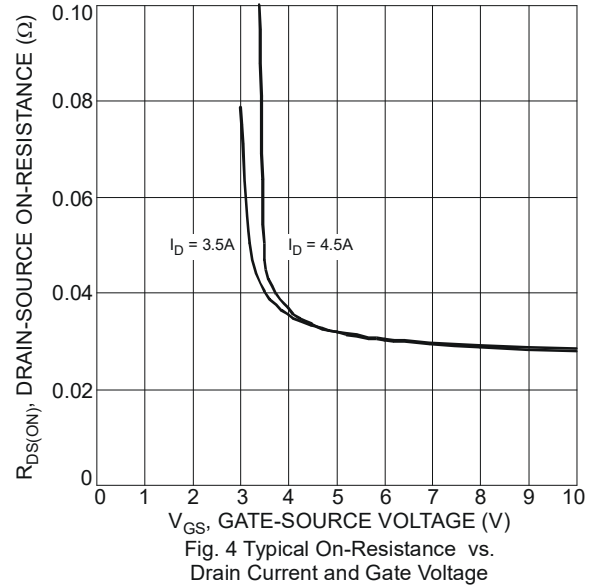
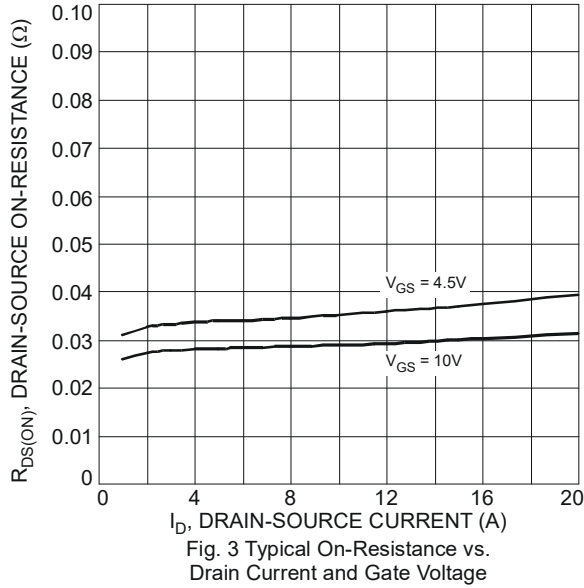
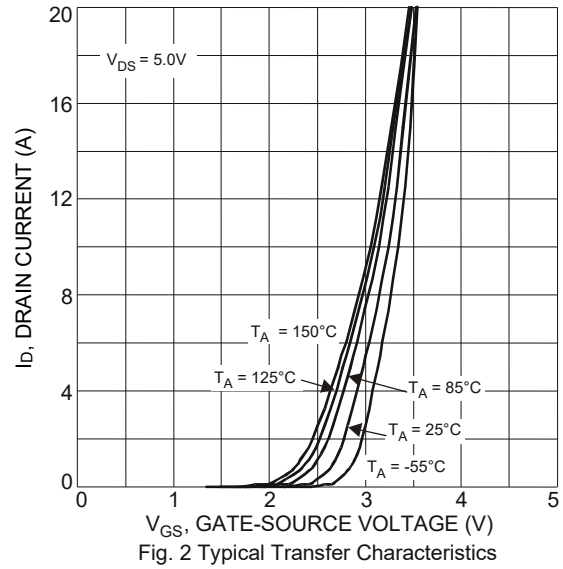
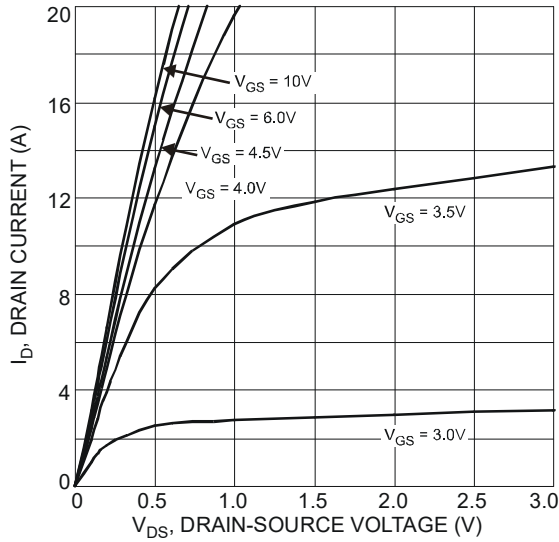
Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T _C = +25°C	P _D	42	W
	T _C = +100°C		17	
Thermal Resistance, Junction to Ambient (Note 5)		R _{θJA}	44	°C/W
Thermal Resistance, Junction to Case (Note 5)		R _{θJC}	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 7)						
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	V _{GS} = 0, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 60V, V _{GS} = 0
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	1	—	3	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	30	40	mΩ	V _{GS} = 10V, I _D = 20A
		—	35	58		V _{GS} = 4.5V, I _D = 12A
Diode Forward Voltage	V _{SD}	—	0.7	1.2	V	V _{GS} = 0, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	1,287	—	pF	V _{DS} = 25V, V _{GS} = 0 f = 1.0MHz
Output Capacitance	C _{oss}	—	57	—		
Reverse Transfer Capacitance	C _{rss}	—	44	—		
Gate Resistance	R _G	—	1.2	—	Ω	V _{DS} = 0, V _{GS} = 0, f = 1.0MHz
Total Gate Charge (V _{GS} = 10V)	Q _g	—	22.4	—	nC	V _{DS} = 30V, I _D = 4.3A
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	10.4	—		
Gate-Source Charge	Q _{gs}	—	4.9	—		
Gate-Drain Charge	Q _{gd}	—	3.0	—		
Turn-On Delay Time	t _{D(ON)}	—	6.6	—	ns	V _{GS} = 10V, V _{DD} = 30V, R _G = 6Ω, I _D = 4.3A
Turn-On Rise Time	t _R	—	8.1	—		
Turn-Off Delay Time	t _{D(OFF)}	—	20.1	—		
Turn-Off Fall Time	t _F	—	4.0	—		
Body Diode Reverse-Recovery Time	t _{RR}	—	18	—	ns	I _S = 4.3A, di/dt = 100A/μs
Body Diode Reverse-Recovery Charge	Q _{RR}	—	11.9	—	nC	I _S = 4.3A, di/dt = 100A/μs

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout.
6. UIS in production with L = 0.1mH, T_J = +25°C.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.



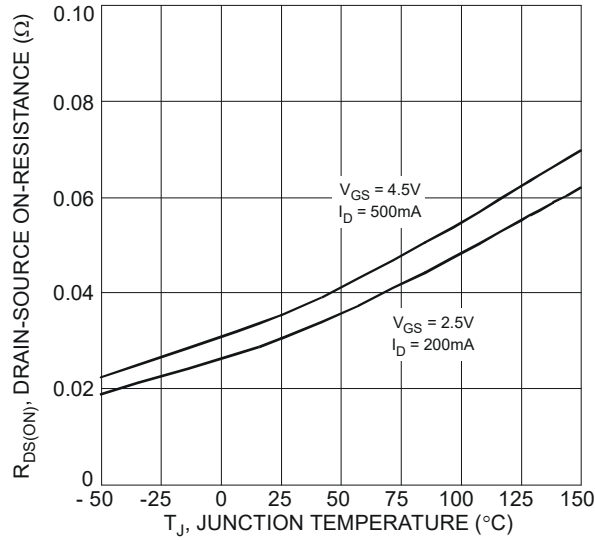


Fig. 7 On-Resistance Variation with Temperature

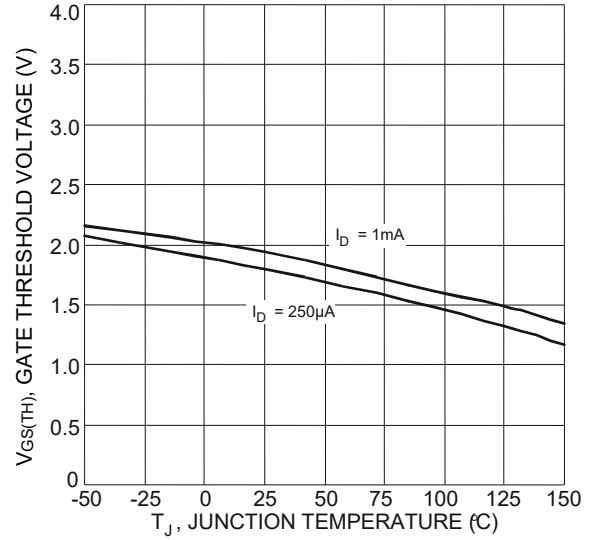


Fig. 8 Gate Threshold Variation vs. Junction Temperature

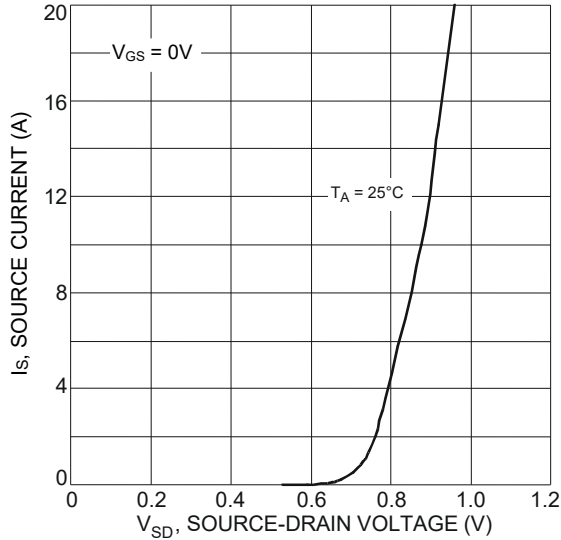


Fig. 9 Diode Forward Voltage vs. Current

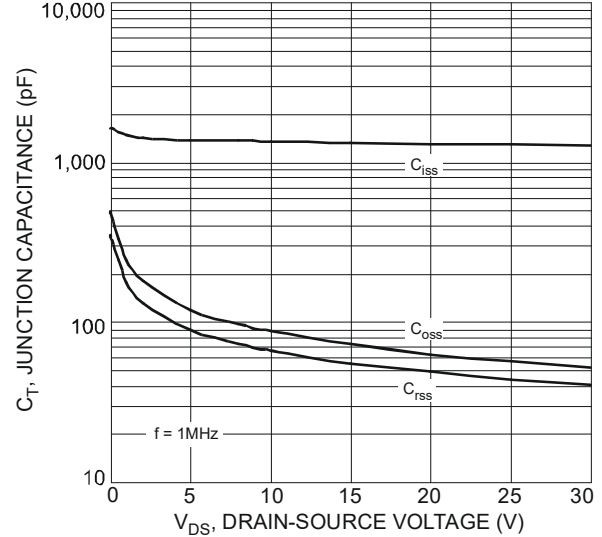


Fig. 10 Typical Junction Capacitance

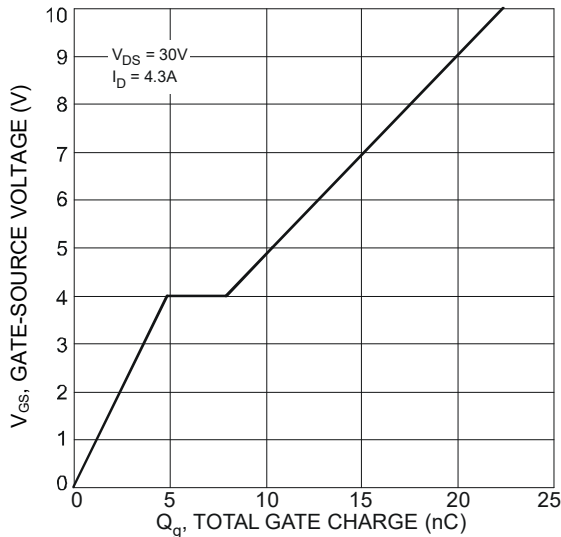


Fig. 11 Gate Charge

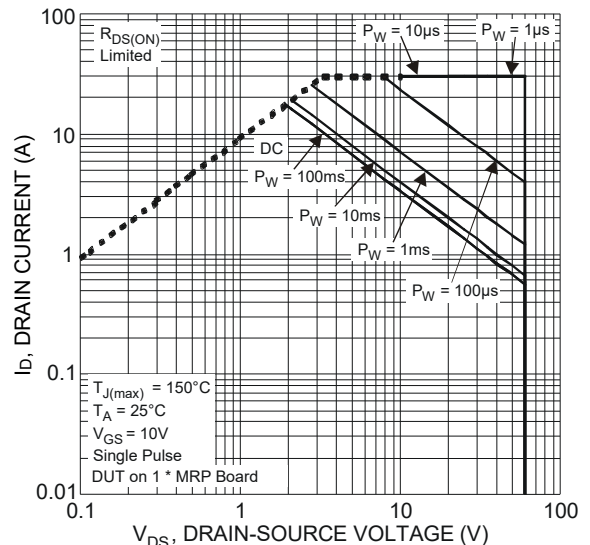
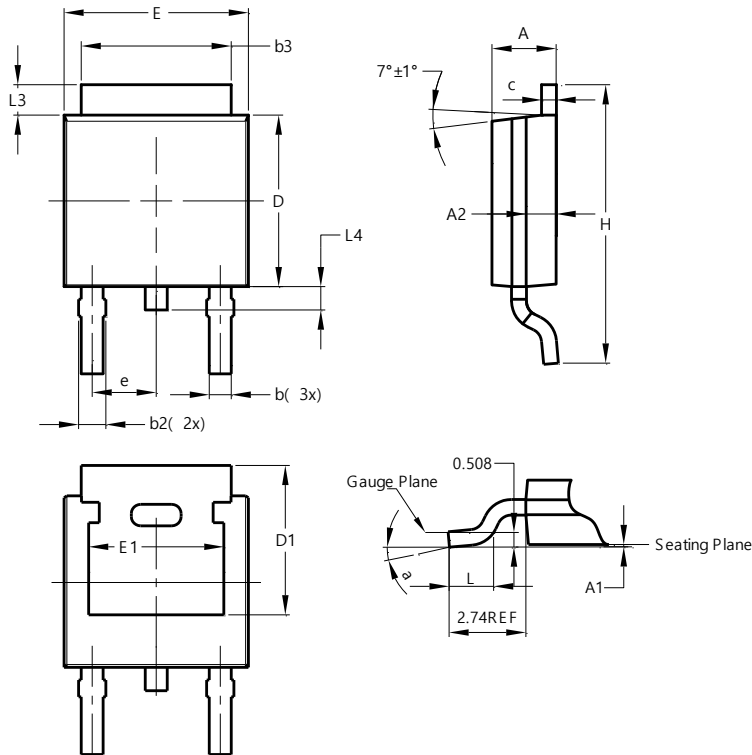


Fig. 12 SOA, Safe Operation Area

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

TO252 (DPAK)

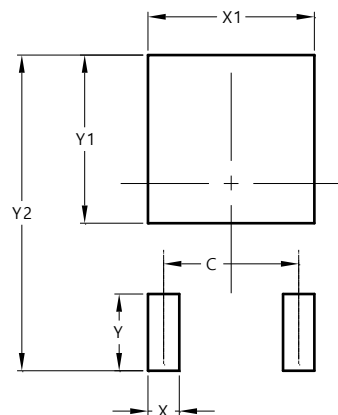


TO252 (DPAK)			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.50	5.33
c	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	--	--
e	2.286 BSC		
E	6.45	6.70	6.58
E1	4.32	--	--
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	--
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

TO252 (DPAK)



Dimensions	Value (in mm)
C	4.572
X	1.060
X1	5.632
Y	2.600
Y1	5.700
Y2	10.700

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