

## N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

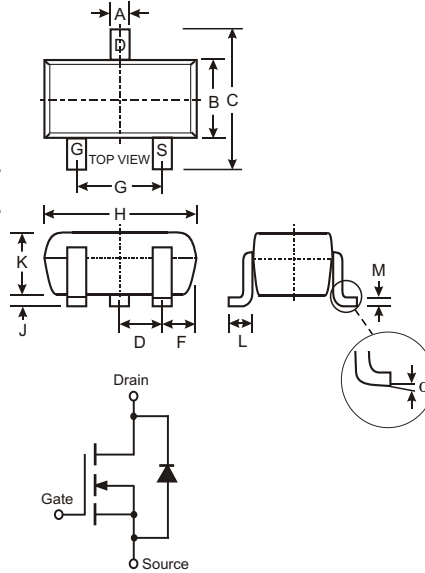
NEW PRODUCT

### Features

- Low Gate Threshold Voltage
- Ultra Low On-Resistance
- Low Input/Output Capacitance
- Low Input/Output Leakage
- Fast Switching Speed

### Mechanical Data

- Case: SC-59, Molded Plastic
- Case material - UL Flammability Rating 94V-0
- Moisture sensitivity: Level 1 per J-STD-020A
- Terminals: Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking: A2, See Page 5
- Weight: 0.008 grams (approx.)
- Ordering Information, See page 5



SC-59		
Dim	Min	Max
A	0.35	0.50
B	1.50	1.70
C	2.70	3.00
D	0.95 nominal	
G	1.90 nominal	
H	2.90	3.10
J	0.013	0.10
K	1.00	1.30
L	0.35	0.55
M	0.10	0.20
$\alpha$	0°	8°
All Dimensions in mm		

### Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Value	Units
Drain-Source Voltage	$V_{DSS}$	30	V
Gate-Source Voltage	$V_{GSS}$	$\pm 12$	V
Drain Current (Note 1) Continuous	$I_D$	4 3.4	A
		$T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$	
Pulsed Drain Current (Note 3)	$I_{DM}$	15	A
Total Power Dissipation (Note 1)	$P_d$	1.3	W
Thermal Resistance, Junction to Ambient (Note 1) $t \leq 10\text{s}$	$R_{\theta JA}$	90	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_j, T_{STG}$	-55 to +150	$^\circ\text{C}$

- Note:
1. Per mounting conditions described in Note 2.
  2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in<sup>2</sup> FR-4 PC board with 2 oz. Copper, in a still air environment at  $T_A = 25^\circ\text{C}$ . The current rating is based on the  $t \leq 10\text{s}$  Thermal Resistance rating.
  3. Repetitive Rating, pulse width limited by junction temperature.

**Electrical Characteristics** @ T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>STATIC PARAMETERS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	30	—	—	V	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1 5	μA	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V T <sub>J</sub> = 25°C T <sub>J</sub> = 55°C
Gate-Body Leakage Current	I <sub>GSS</sub>	—	—	100	nA	V <sub>DS</sub> = 0V, V <sub>GS</sub> = +12V
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.6	1	1.4	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
On State Drain Current	I <sub>D(ON)</sub>	10	—	—	A	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 5V
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	45 55 83	55 70 110	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 4A V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3A V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 2A
Forward Transconductance	g <sub>FS</sub>	—	8	—	S	V <sub>DS</sub> = 5V, I <sub>D</sub> = 4A
Diode Forward Voltage	V <sub>SD</sub>	—	0.8	1	V	I <sub>S</sub> = 1A, V <sub>GS</sub> = 0V
Maximum Body-Diode Continuous Current	I <sub>S</sub>	—	—	2.5	A	
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>iss</sub>	—	390	—	pF	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 15V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	54.5	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	41	—	pF	
Gate Resistance	R <sub>g</sub>	—	3	—	Ω	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1MHz
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>g</sub>	—	0.6	—	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 15V, I <sub>D</sub> = 4A
Gate Source Charge	Q <sub>gs</sub>	—	1.38	—	nC	
Gate Drain Charge	Q <sub>gd</sub>	—	4.34	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	3.3	—	ns	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 15V, R <sub>L</sub> = 3.75Ω, R <sub>GEN</sub> = 6Ω
Turn-On Rise Time	t <sub>r</sub>	—	1	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	21.7	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	2.1	—	ns	
Body Diode Reverse Recovery Time	t <sub>rr</sub>	—	12	—	ns	I <sub>F</sub> = 4A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	—	6.3	—	nC	I <sub>F</sub> = 4A, di/dt = 100A/μs

- Note:
- The static characteristics in Figures 1-6, 12, 14 are obtained using 80μs pulses, duty cycle 0.5% max.
  - These tests are performed with device mounted on 1 in<sup>2</sup> FR-4 PC board with 2 oz. copper, in a still air environment at T<sub>A</sub> = 25°C. The SOA curve provides a single pulse rating.

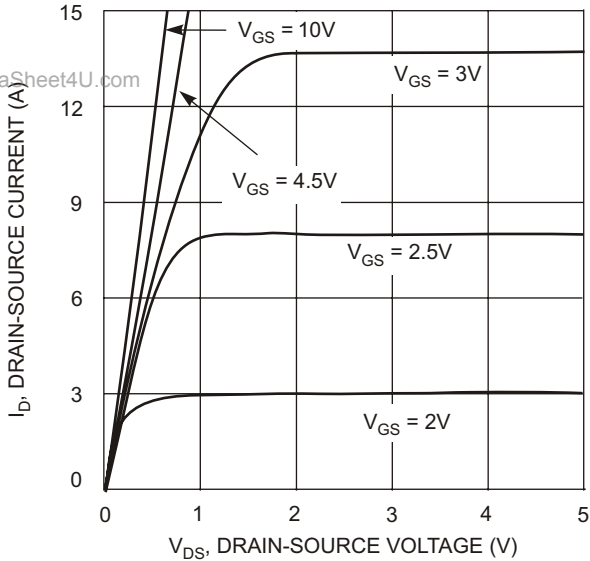


Fig. 1 On-Region Characteristics

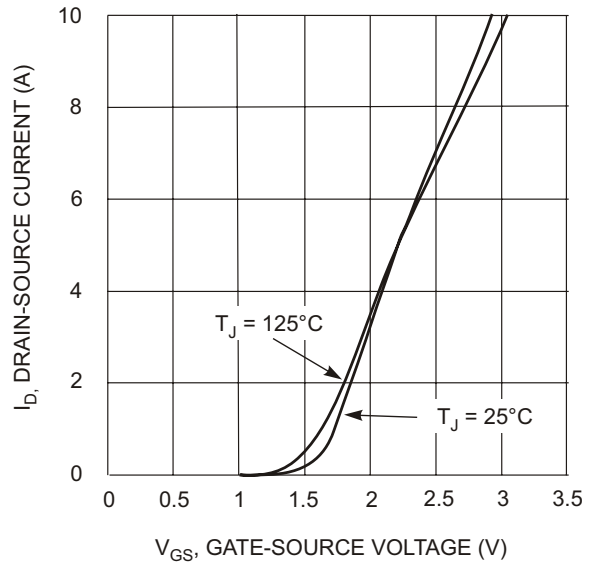


Fig. 2 Transfer Characteristics

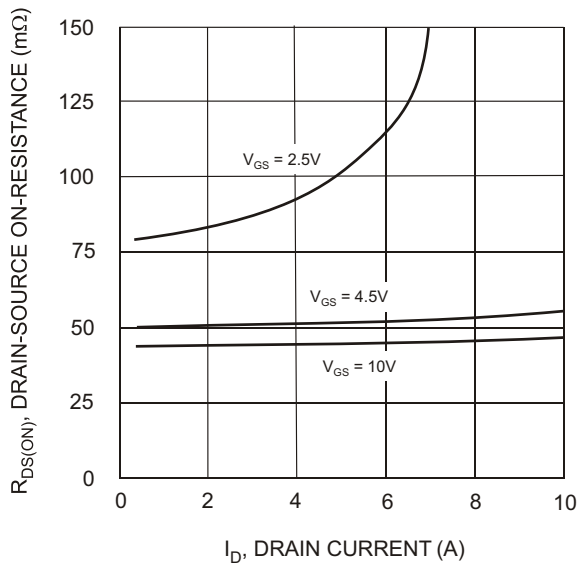


Fig. 3 On-Resistance vs. Drain Current and Gate Voltage

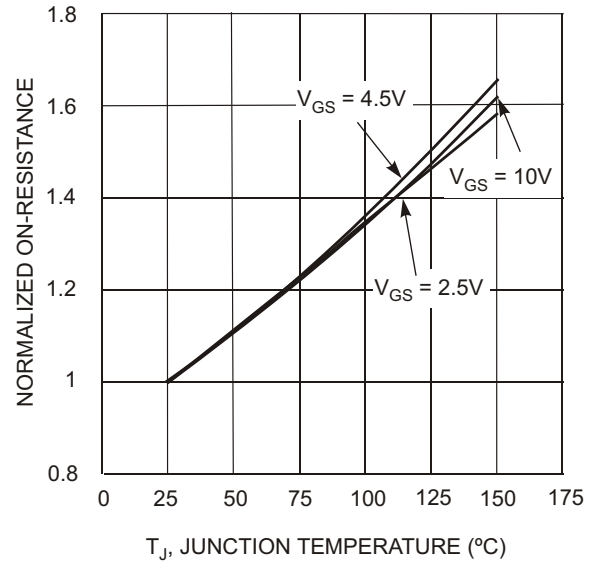


Fig. 4 On-Resistance vs. Junction Temperature

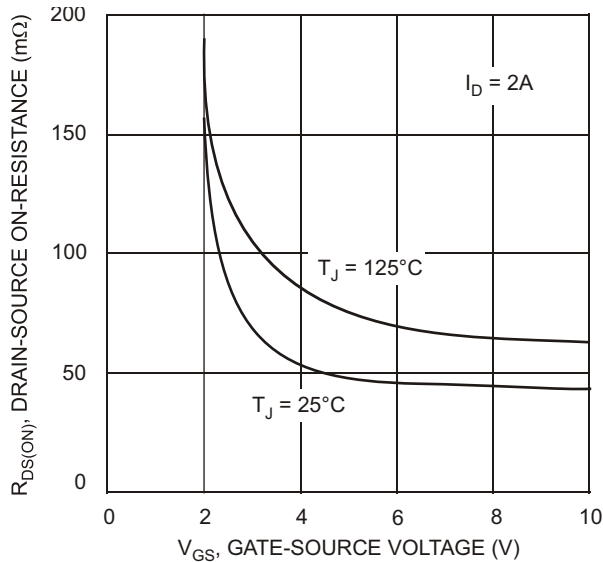


Fig. 5 On-Resistance vs. Gate-Source Voltage

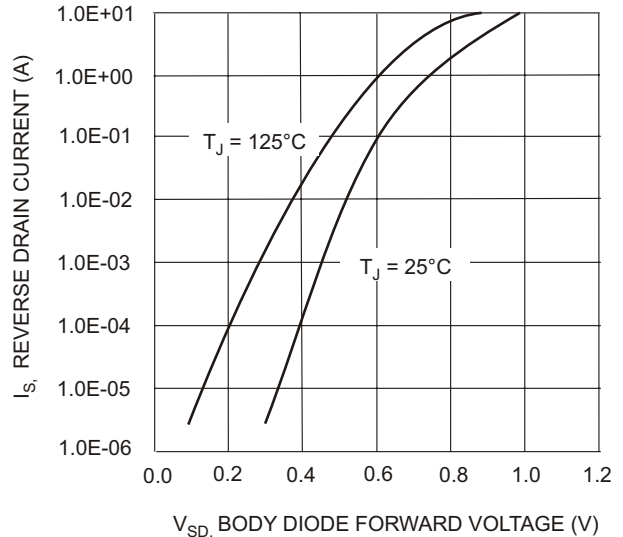


Fig. 6 Body-Diode Forward Voltage Variation with Source Current and Temperature

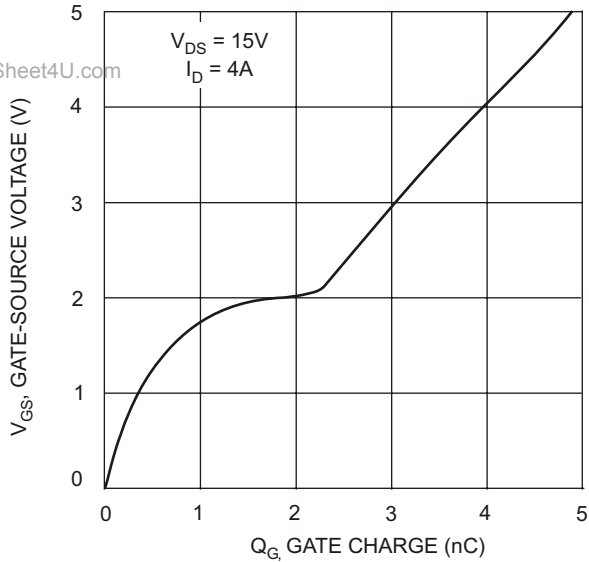


Fig. 7 Gate-Charge Characteristics

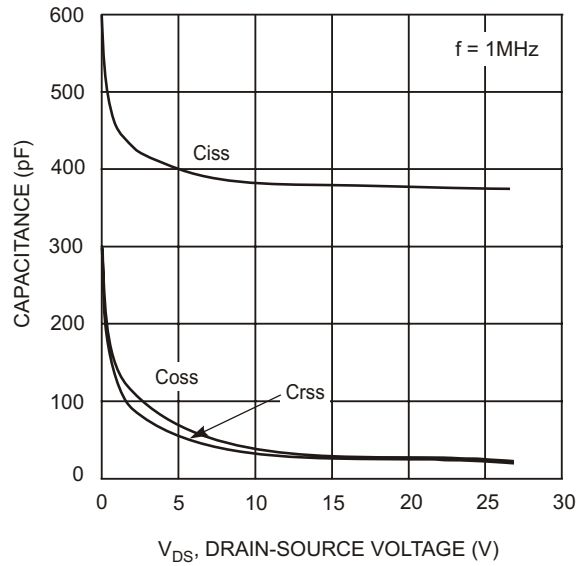


Fig. 8 Capacitance Characteristics

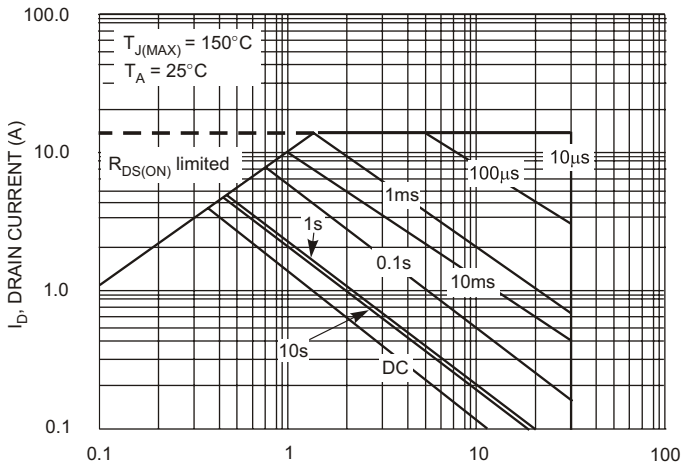


Fig. 9 Maximum Forward Biased Safe Operating Area (Note 5)

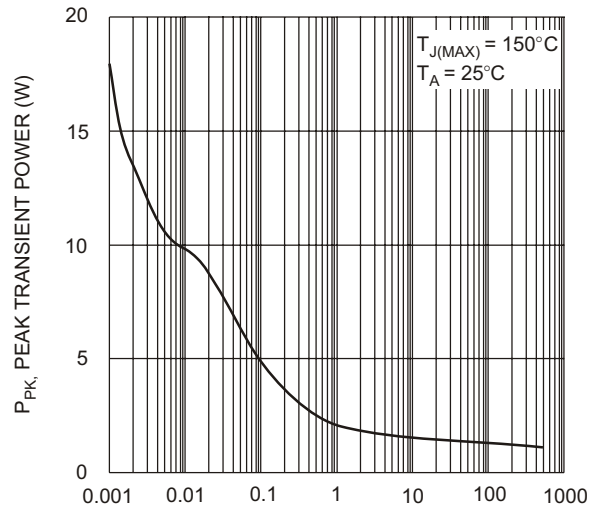


Fig. 10 Single Pulse Power Rating Junction-to-Ambient (Note 5)

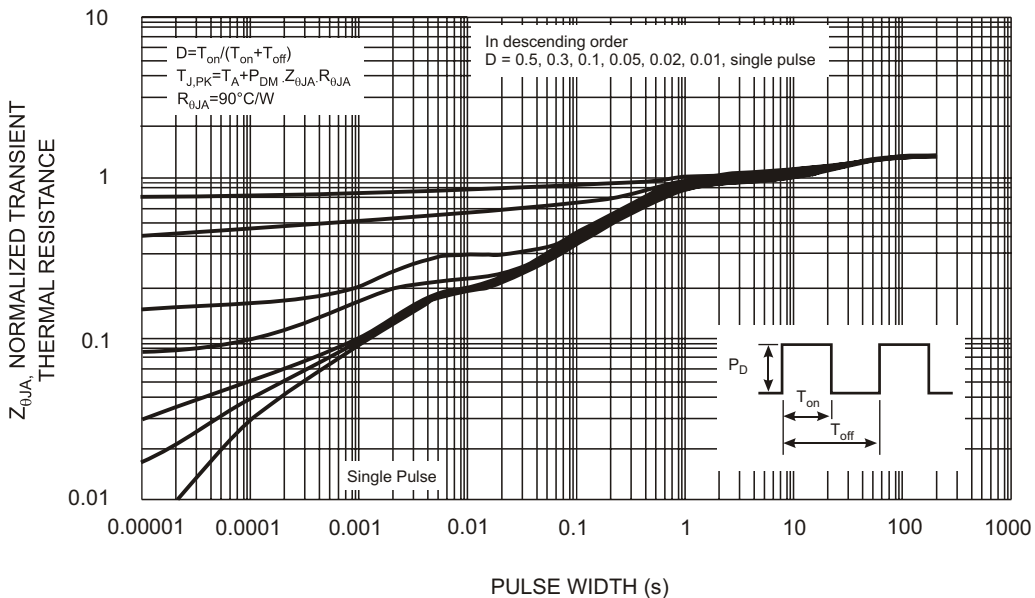


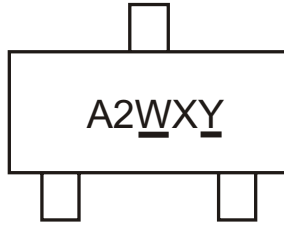
Fig. 11 Normalized Maximum Transient Thermal Impedance

**Ordering Information** (Note 6)

Device	Packaging	Shipping
DMN3410-7	SC-59	3000/Tape & Reel

Notes: 6. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**



A2 = Product Type Marking Code  
 W = Week and Year Code Marking  
 XY = Lot Code Marking  
 Y = Assembly Location, Diodes China

Week Code Key

Week	0 - 1	2 - 3	4 - 5	6 - 7	8 - 9	10 - 11	12 - 13	14 - 15	16 - 17
Code	A	B	C	D	E	F	G	H	J
Week	18 - 19	20 - 21	22 - 23	24 - 25	26 - 27	28 - 29	30 - 31	32 - 33	34 - 35
Code	K	L	N	O	P	R	S	T	U
Week	36 - 37	38 - 39	40 - 41	42 - 43	44 - 45	46 - 47	48 - 49	50 - 51	52 - 53
Code	V	X	Y	Z	1	2	3	4	5

Year Code Key

Year	2002	2003	2004	2005
Code	<u>W</u>	<u>W</u>	<u>W</u>	<u>W</u>