

APM9948J-VB Datasheet

Dual N-Channel 60 V (D-S) MOSFET

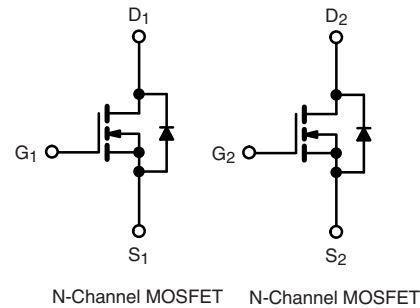
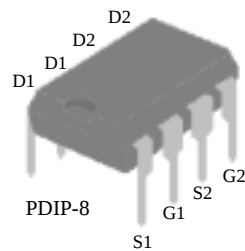
PRODUCT SUMMARY	
V_{DS} (V)	60
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.033
$R_{DS(on)}$ (Ω) at $V_{GS} = 4.5$ V	0.045
I_D (A) per leg	7
Configuration	Dual

FEATURES

- Trench power MOSFET
- 100 % R_g and UIS tested



RoHS
COMPLIANT
HALOGEN
FREE



ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	$T_C = 25^\circ\text{C}$	I_D	7	A
	$T_C = 125^\circ\text{C}$		4	
Continuous Source Current (Diode Conduction) ^a		I_S	3.6	
Pulsed Drain Current ^b		I_{DM}	28	
Single Pulse Avalanche Current	$L = 0.1$ mH	I_{AS}	18	mJ
Single Pulse Avalanche Energy		E_{AS}	16.2	
Maximum Power Dissipation ^b	$T_C = 25^\circ\text{C}$	P_D	4	W
	$T_C = 125^\circ\text{C}$		1.3	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount ^c	R_{thJA}	110	$^\circ\text{C/W}$
Junction-to-Foot (Drain)		R_{thJF}	34	

Notes

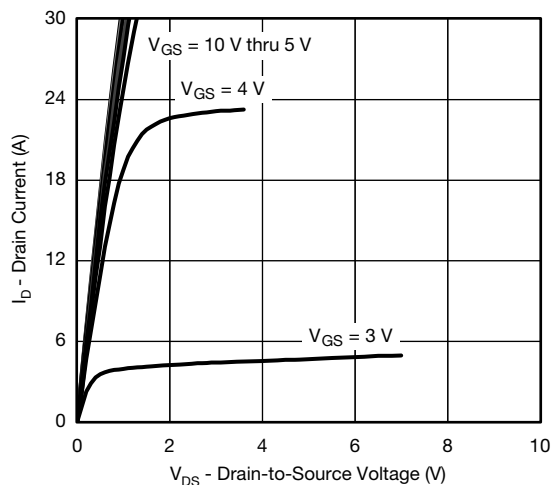
- Package limited.
- Pulse test; pulse width ≤ 300 μs , duty cycle $\leq 2\%$.
- When mounted on 1" square PCB (FR4 material).

SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		60	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		1.5	2.0	2.5	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 60 V	-	-	1	μA
		V _{GS} = 0 V	V _{DS} = 60 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 60 V, T _J = 175 °C	-	-	150	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	20	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 4.5 A	-	0.033	-	Ω
		V _{GS} = 10 V	I _D = 4.5 A, T _J = 125 °C	-	0.066	-	
		V _{GS} = 10 V	I _D = 4.5 A, T _J = 175 °C	-	0.081	-	
		V _{GS} = 4.5 V	I _D = 4 A	-	0.045	-	
Forward Transconductance ^f	g _{fs}	V _{DS} = 15 V, I _D = 4.5 A		-	15	-	S
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	600	750	pF
Output Capacitance	C _{oss}			-	110	140	
Reverse Transfer Capacitance	C _{rss}			-	50	62	
Total Gate Charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 30 V, I _D = 5.3 A	-	11.7	18	nC
Gate-Source Charge ^c	Q _{gs}			-	1.8	2.7	
Gate-Drain Charge ^c	Q _{gd}			-	2.8	4.2	
Gate Resistance	R _g	f = 1 MHz		1.3	-	6	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 6.8 Ω I _D ≡ 4.4 A, V _{GEN} = 10 V, R _g = 1 Ω		-	7	11	ns
Rise Time ^c	t _r			-	3.3	5	
Turn-Off Delay Time ^c	t _{d(off)}			-	22.4	33.5	
Fall Time ^c	t _f			-	2.1	3.2	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed Current ^a	I _{SM}			-	-	28	A
Forward Voltage	V _{SD}	I _F = 2 A, V _{GS} = 0 V		-	0.75	1.1	V

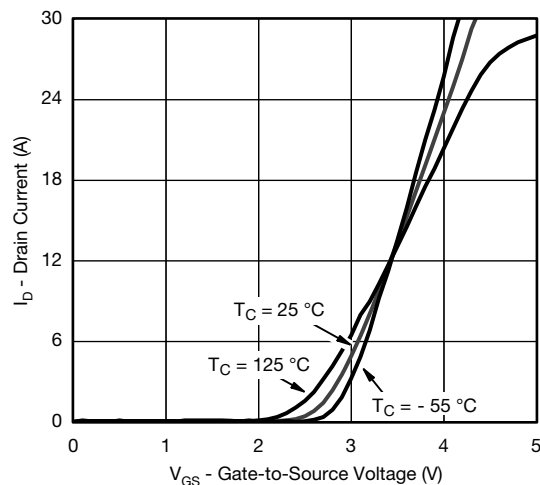
Notes

- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

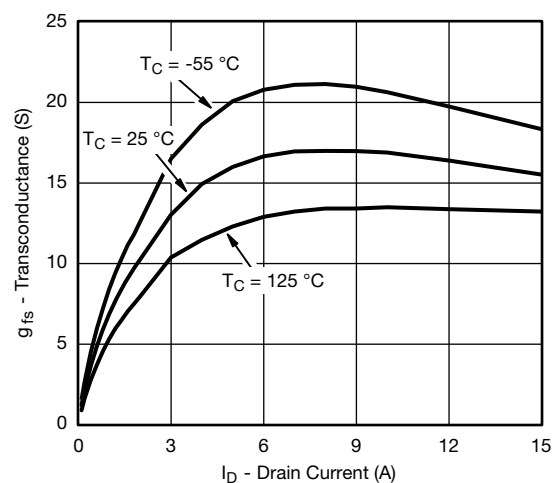
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



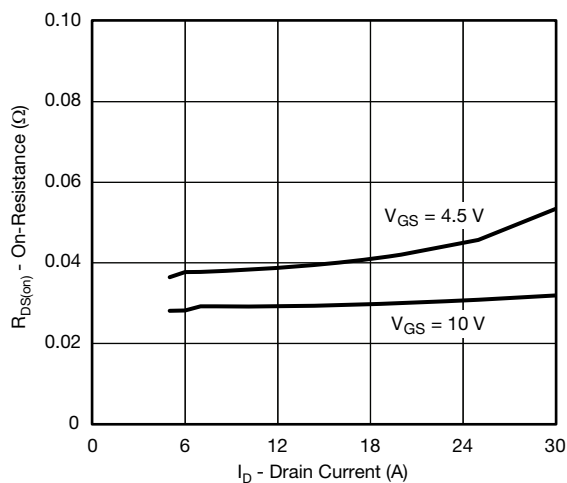
Output Characteristics



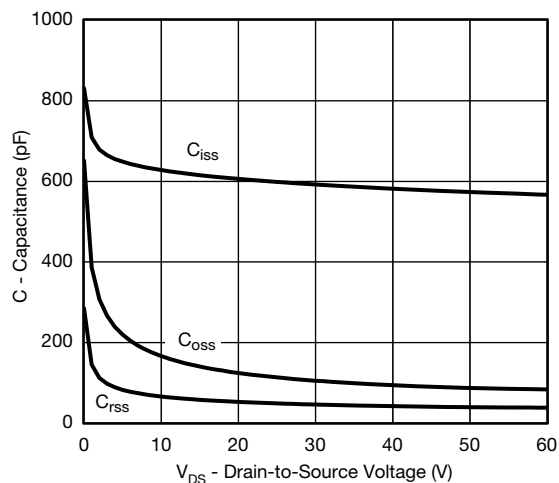
Transfer Characteristics



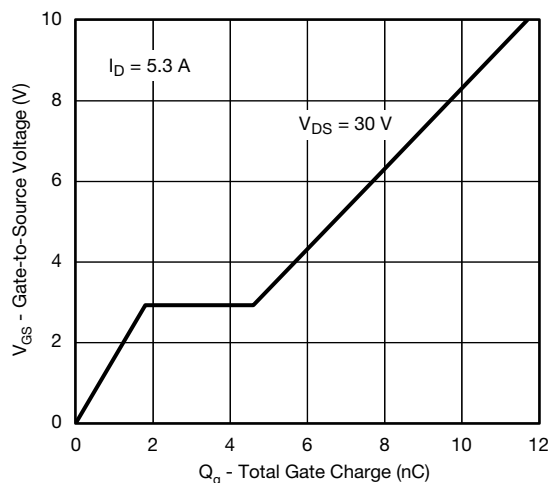
Transconductance



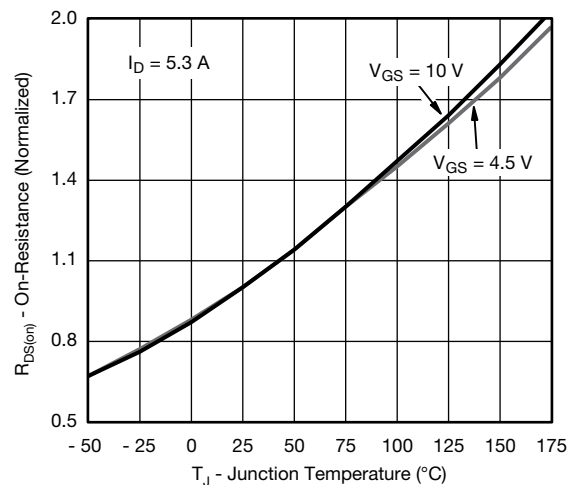
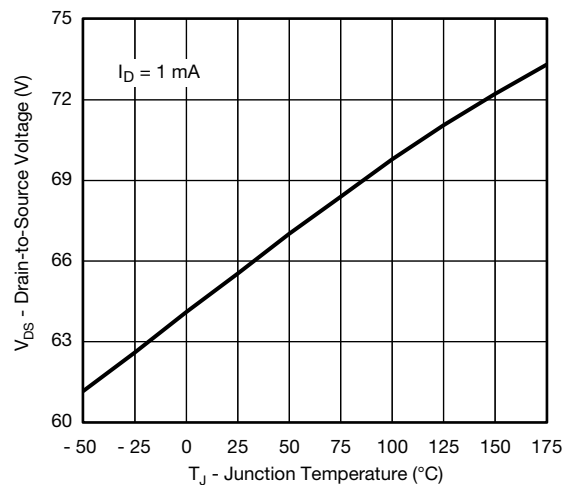
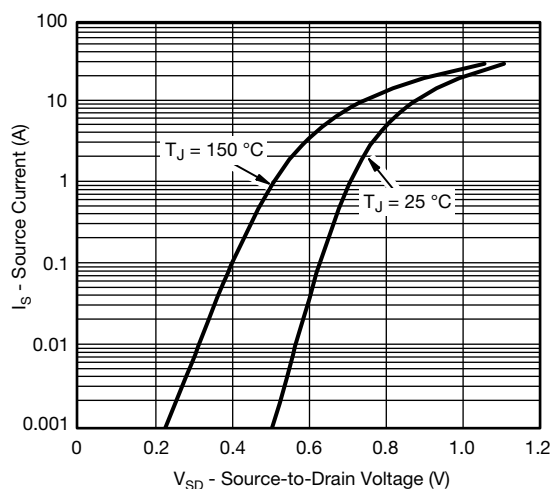
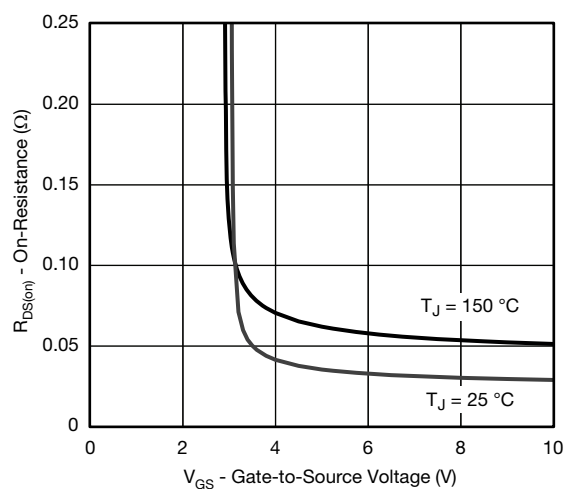
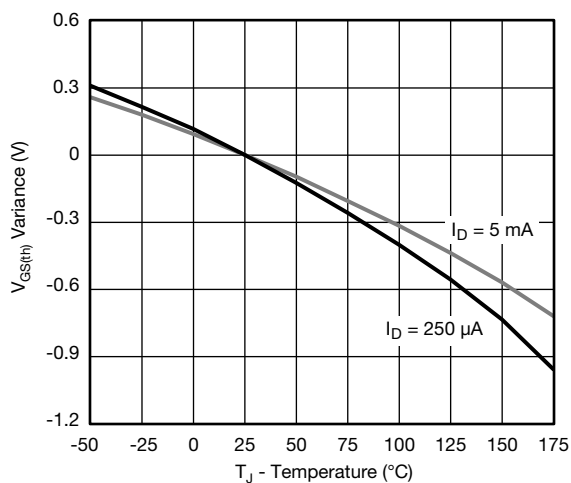
On-Resistance vs. Drain Current



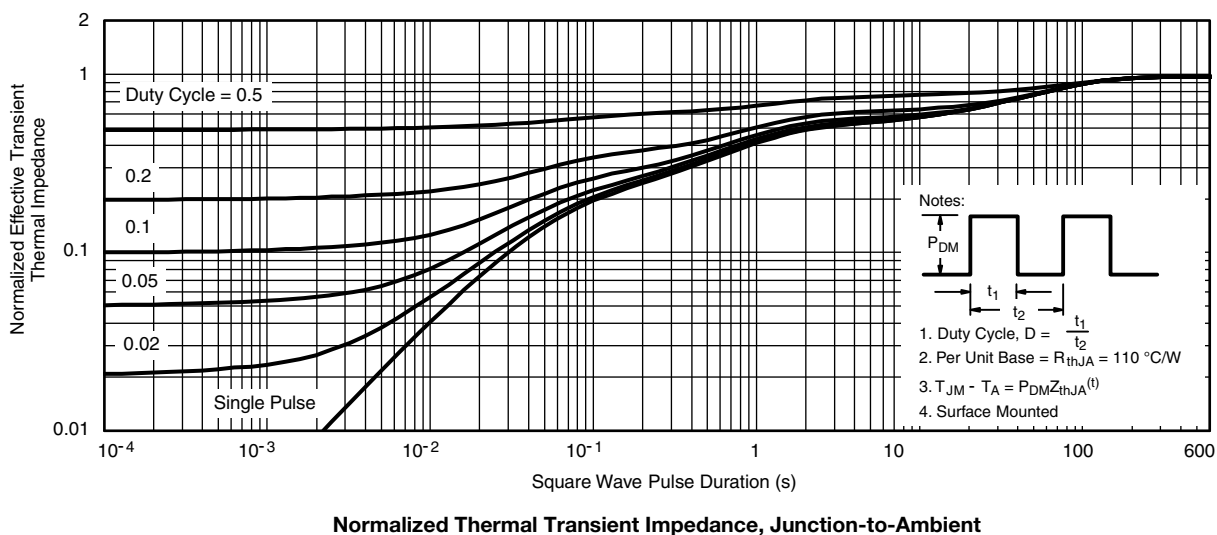
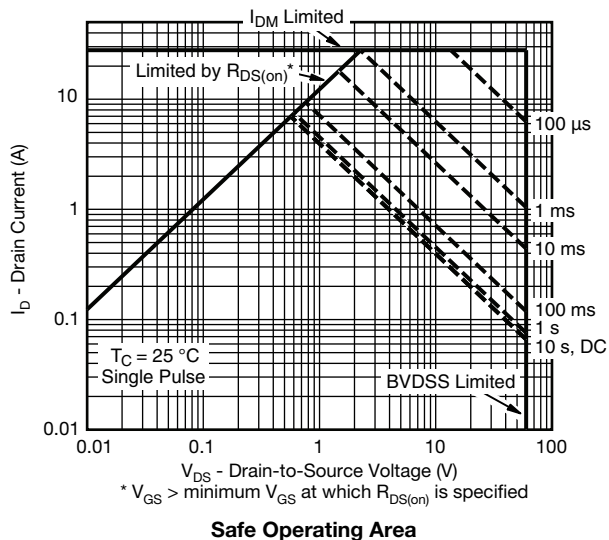
Capacitance



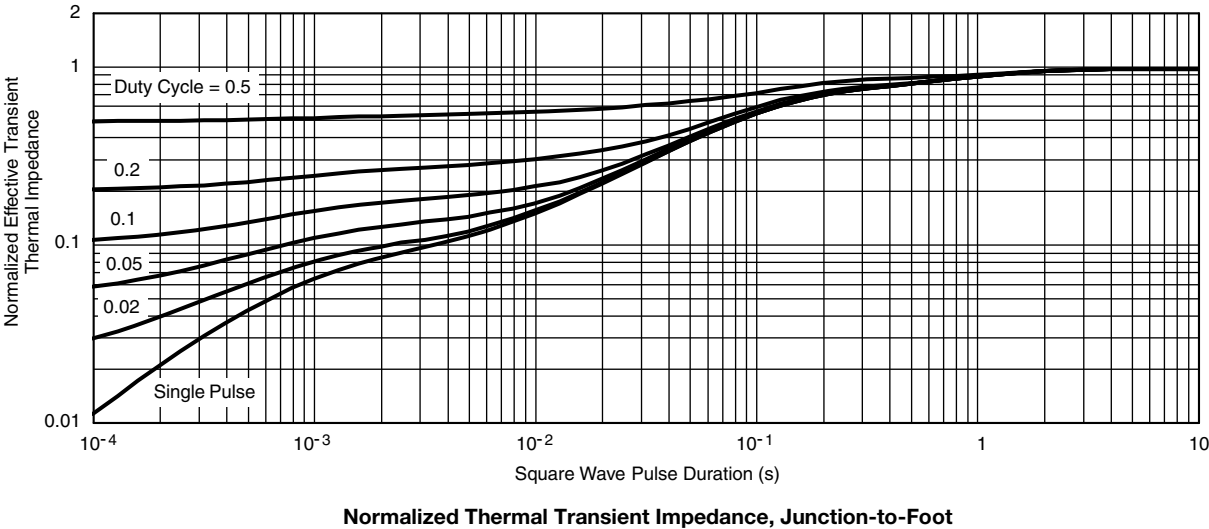
Gate Charge

TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

On-Resistance vs. Junction Temperature

Drain Source Breakdown vs. Junction Temperature

Source Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

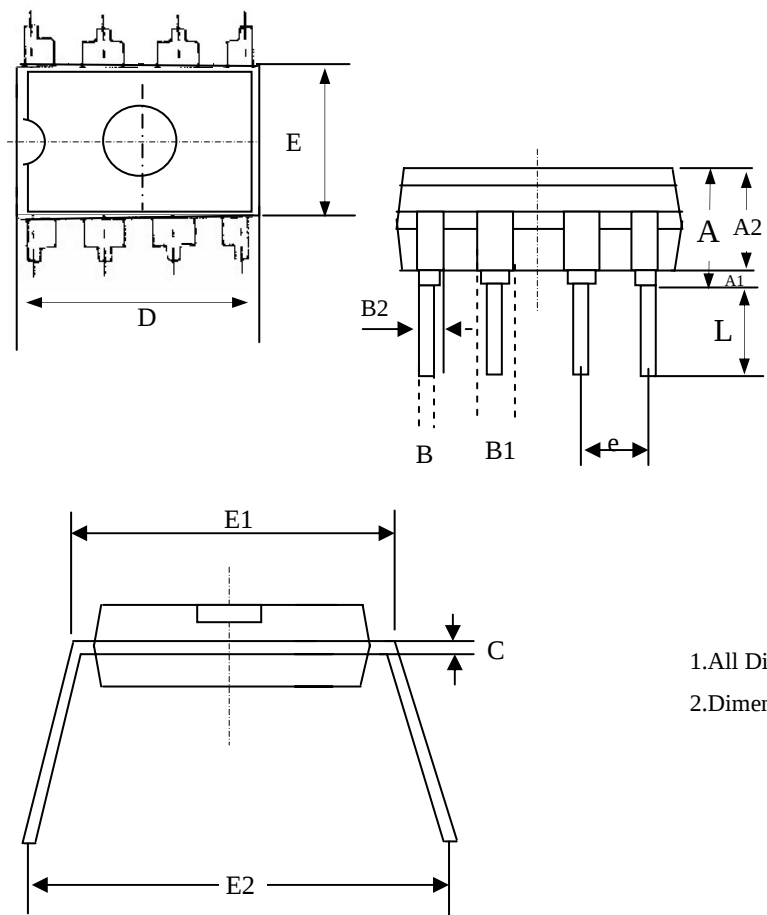
THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



Package Outline : PDIP-8



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	3.60	4.50	5.40
A1	0.38	----	----
A2	2.90	3.95	5.00
B	0.36	0.46	0.56
B1	1.10	1.45	1.80
B2	0.76	0.98	1.20
C	0.20	0.28	0.36
D	9.00	9.60	10.20
E	6.10	6.65	7.20
E1	7.62	7.94	8.26
E2	8.30	9.65	11.00
e	2.540 BSC		
L	3.18	----	----

- 1.All Dimensions Are in Millimeters.
- 2.Dimension Does Not Include Mold Protrusions.

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