

IPD380P06NMATMA1-VB Datasheet

P-Channel 60 V (D-S) MOSFET

PRODUCT SUMMARY		
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)
- 60	0.020 at V _{GS} = - 10 V	- 50
	0.025 at V _{GS} = - 4.5 V	- 45

FEATURES

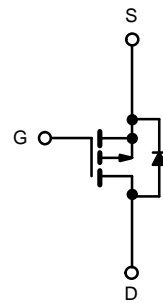
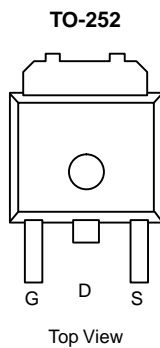
- TrenchFET[®] Power MOSFET
- Material categorization:



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Load Switch



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °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 _J = 175 °C)	I _D	T _C = 25 °C	- 50	
		T _C = 125 °C	- 40	
Pulsed Drain Current	I _{DM}	- 160	A	
Avalanche Current	I _{AS}	- 50		
Single Pulse Avalanche Energy ^a	L = 0.1 mH	E _{AS}	125	mJ
Power Dissipation	P _D	T _C = 25 °C	113 ^c	W
		T _A = 25 °C	2.5 ^{b, c}	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Junction-to-Ambient ^b	R _{thJA}	t ≤ 10 s	15	18	°C/W
		Steady State	40	50	
Junction-to-Case	R _{thJC}	0.82	1.1		

Notes:

- Duty cycle ≤ 1 %.
- When mounted on 1" square PCB (FR-4 material).
- See SOA curve for voltage derating.
- Package limited.

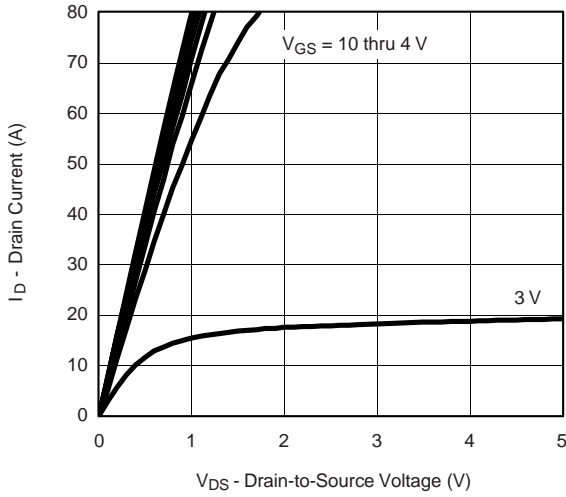
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 60			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1.5		- 3	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			- 50	
		$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$			- 100	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	- 50			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -17\text{ A}$		0.020		Ω
		$V_{GS} = -10\text{ V}, I_D = -40\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.030		
		$V_{GS} = -10\text{ V}, I_D = -40\text{ A}, T_J = 150\text{ }^\circ\text{C}$		0.035		
		$V_{GS} = -4.5\text{ V}, I_D = -14\text{ A}$		0.025		
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -17\text{ A}$		61		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = -25\text{ V}, f = 1\text{ MHz}$		2950		μF
Output Capacitance	C_{oss}			380		
Reverse Transfer Capacitance	C_{rss}			305		
Total Gate Charge ^c	Q_g	$V_{DS} = -30\text{ V}, V_{GS} = -10\text{ V}, I_D = -40\text{ A}$		110	165	nC
Gate-Source Charge ^c	Q_{gs}			19		
Gate-Drain Charge ^c	Q_{gd}			28		
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = -30\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D \cong -40\text{ A}, V_{GEN} = -10\text{ V}, R_G = 6\text{ }\Omega$		15	23	ns
Rise Time ^c	t_r			70	105	
Turn-Off Delay Time ^c	$t_{d(off)}$			175	260	
Fall Time ^c	t_f			175	260	
Source-Drain Diode Ratings and Characteristics $T_C = 25\text{ }^\circ\text{C}^b$						
Continuous Current	I_S				- 40	A
Pulsed Current	I_{SM}				- 80	
Forward Voltage ^a	V_{SD}	$I_F = -40\text{ A}, V_{GS} = 0\text{ V}$		- 1	- 1.6	V
Reverse Recovery Time	t_{rr}	$I_F = -40\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$		45	70	ns

Notes:

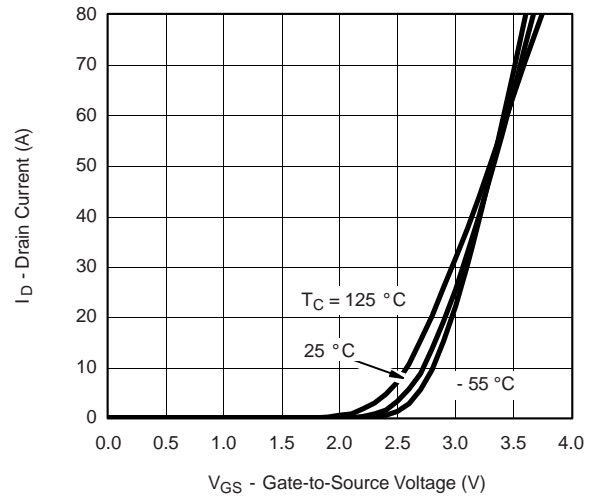
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

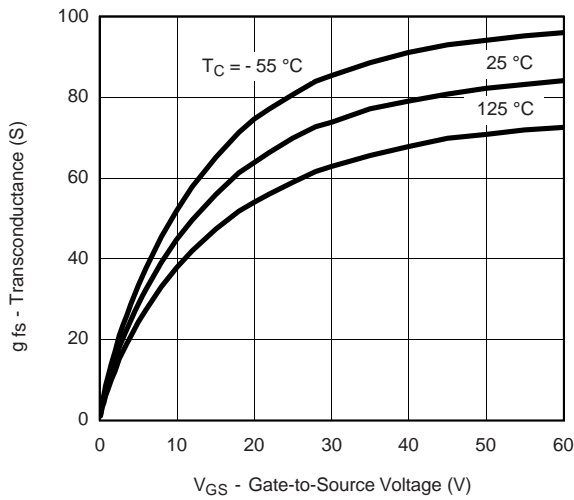
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



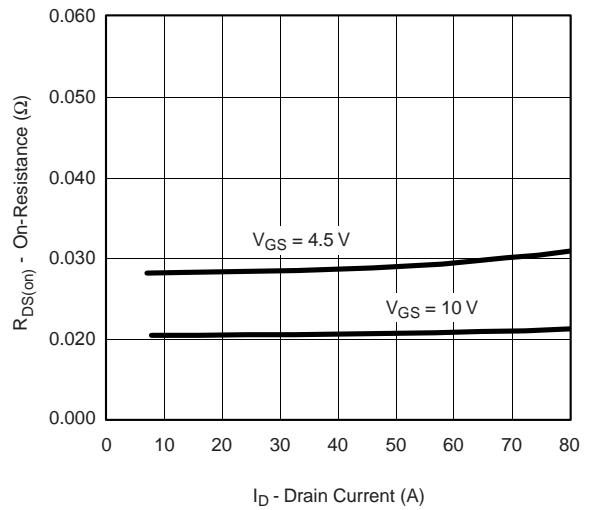
Output Characteristics



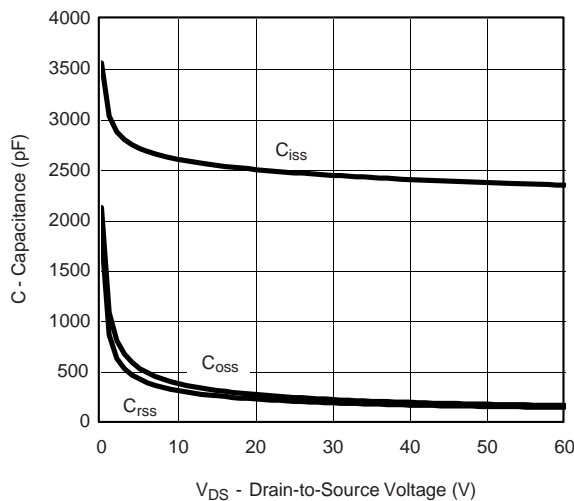
Transfer Characteristics



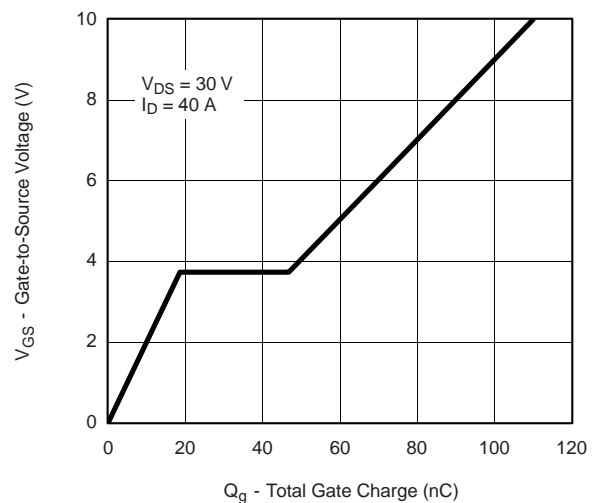
Transconductance



On-Resistance vs. Drain Current

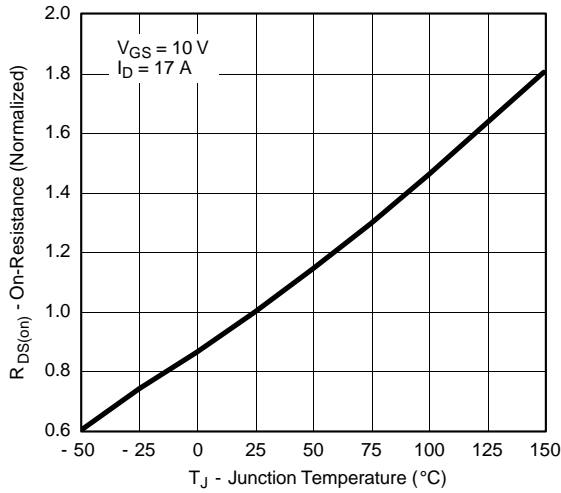


Capacitance

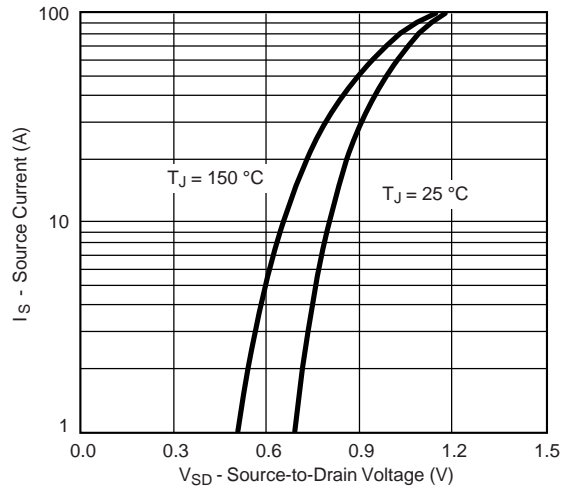


Gate Charge

TYPICAL CHARACTERISTICS

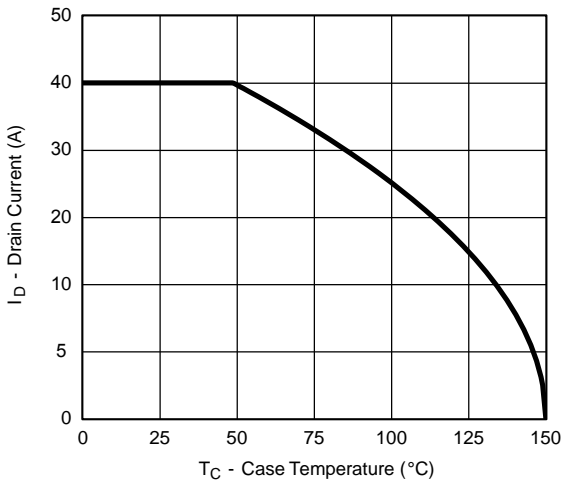


On-Resistance vs. Junction Temperature

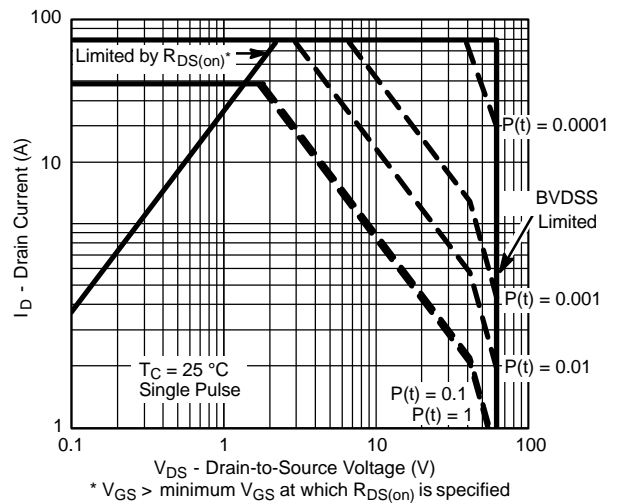


Source-Drain Diode Forward Voltage

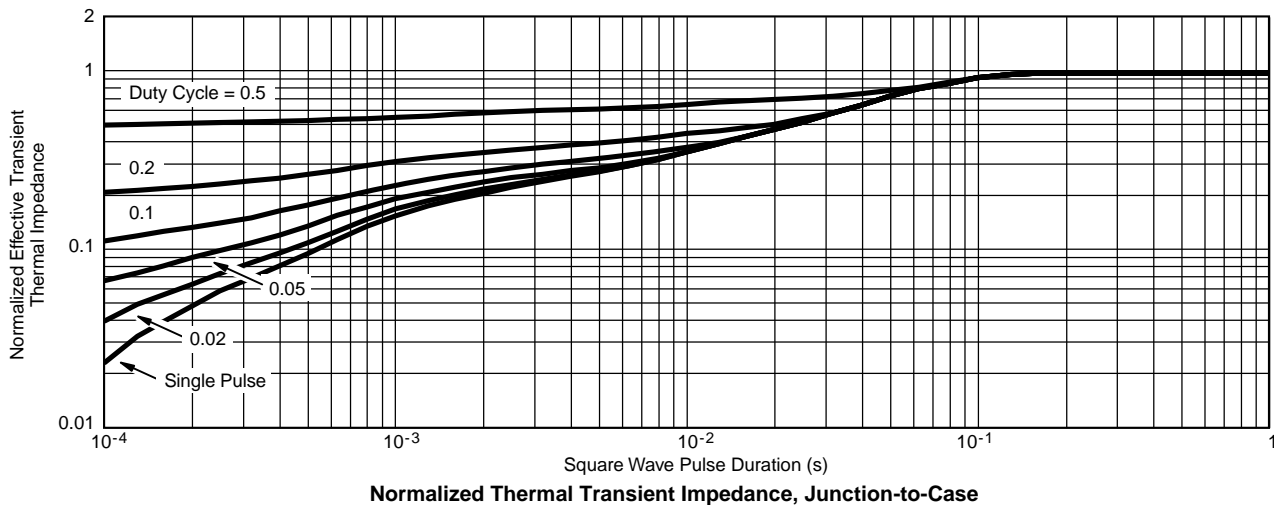
THERMAL RATINGS (25 °C, unless otherwise noted)



Drain Current vs. Case Temperature

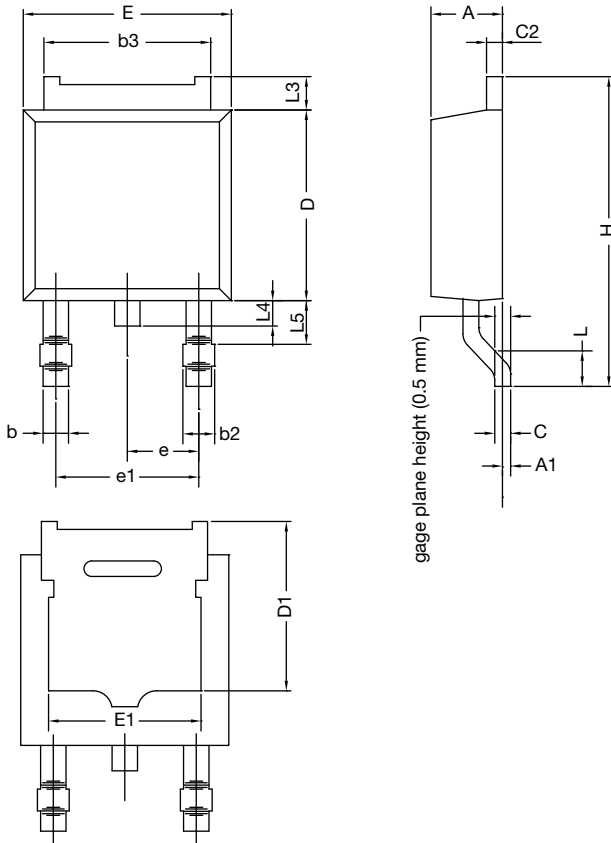


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

TO-252AA CASE OUTLINE

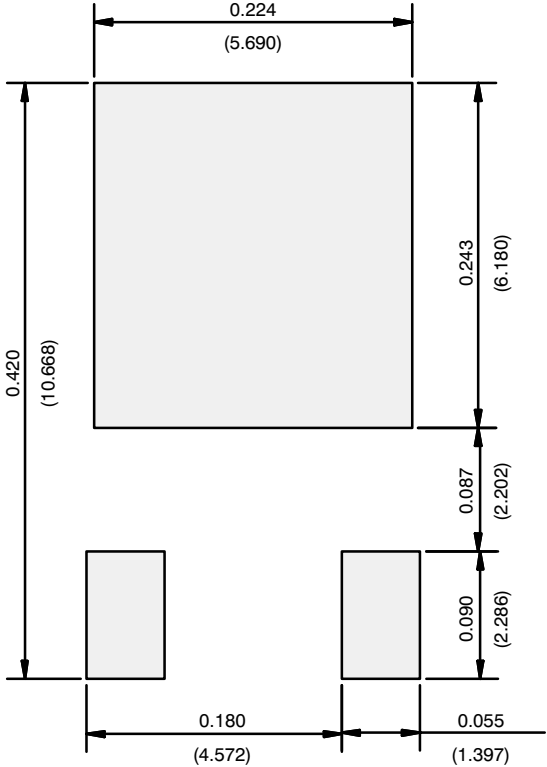


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	10.41	0.370	0.410
e	2.28 BSC		0.090 BSC	
e1	4.56 BSC		0.180 BSC	
L	1.40	1.78	0.055	0.070
L3	0.89	1.27	0.035	0.050
L4	-	1.02	-	0.040
L5	1.14	1.52	0.045	0.060
ECN: X12-0247-Rev. M, 24-Dec-12 DWG: 5347				

Note

- Dimension L3 is for reference only.

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

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