

P2504EI-VB Datasheet

P-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY

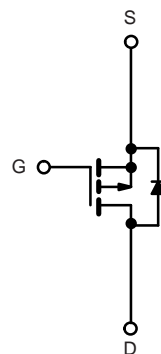
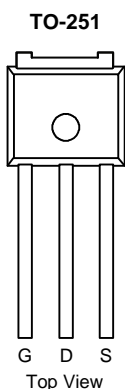
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a
- 40	0.010 at $V_{GS} = -10$ V	± 55
	0.014 at $V_{GS} = -4.5$ V	± 54

FEATURES

- Compliant to RoHS Directive 2002/95/EC



Available
RoHS*
COMPLIANT



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Gate-Source Voltage	V_{GS}	± 40	V
Continuous Drain Current ($T_J = 175^\circ\text{C}$)	I_D	$- 55^a$	A
		$- 52$	
Pulsed Drain Current	I_{DM}	$- 220$	
Avalanche Current	I_{AR}	$- 60$	
Repetitive Avalanche Energy ^b	E_{AR}	180	mJ
Power Dissipation	P_D	45	W
		3.75	
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	R_{thJA}	40	$^\circ\text{C/W}$
		62.5	
Junction-to-Case	R_{thJC}	0.8	

Notes:

a. Package limited.

b. Duty cycle $\leq 1\%$.

c. When mounted on 1" square PCB (FR-4 material).

d. See SOA curve for voltage derating.

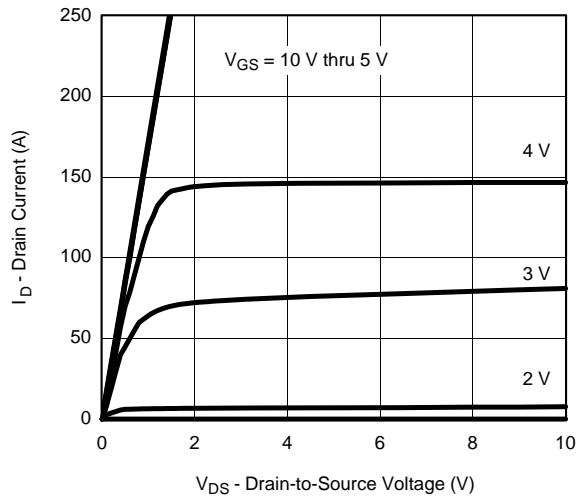
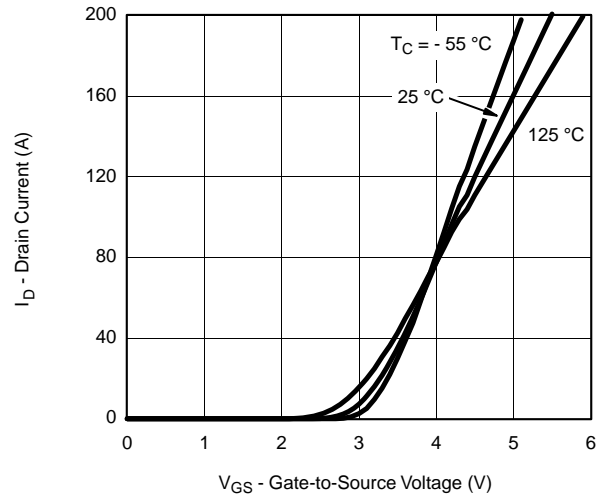
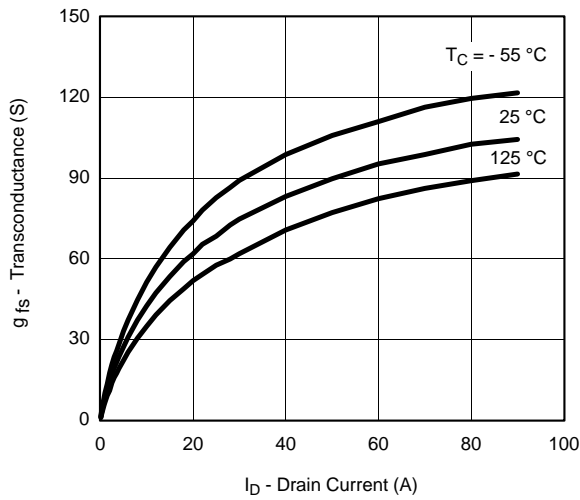
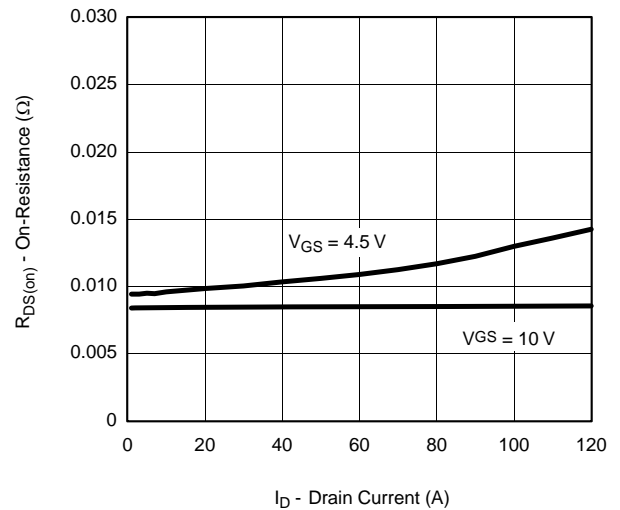
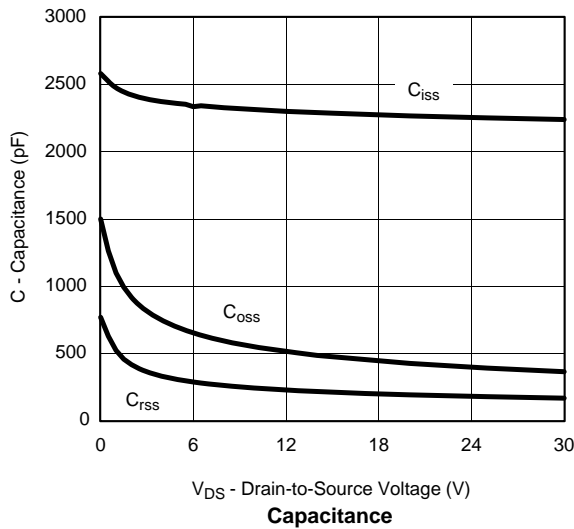
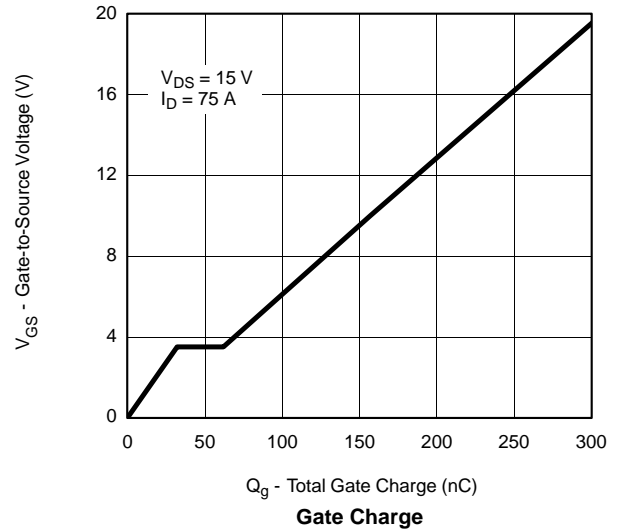
* Pb containing terminations are not RoHS compliant, exemptions may apply.

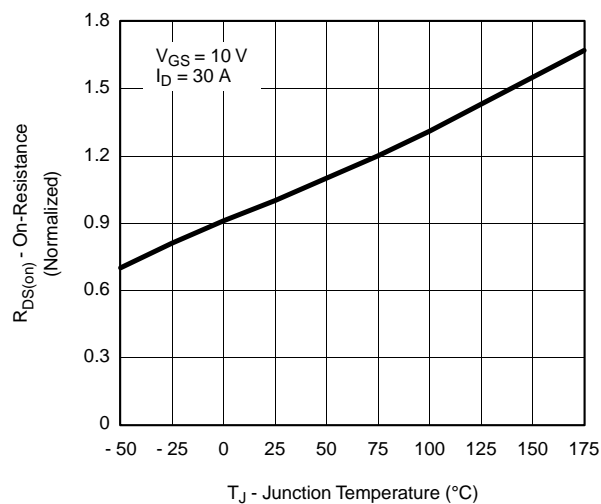
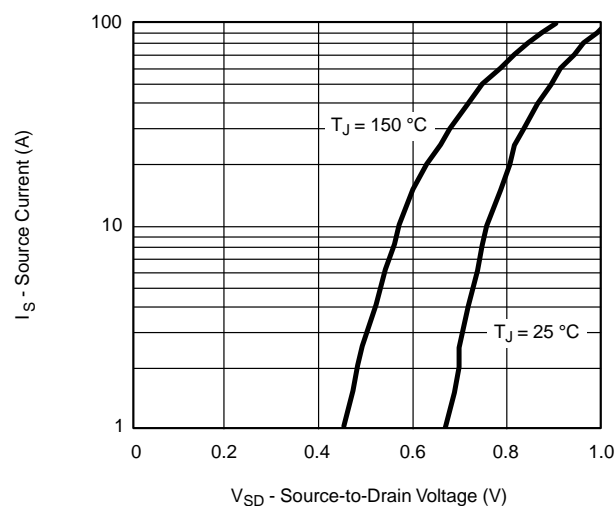
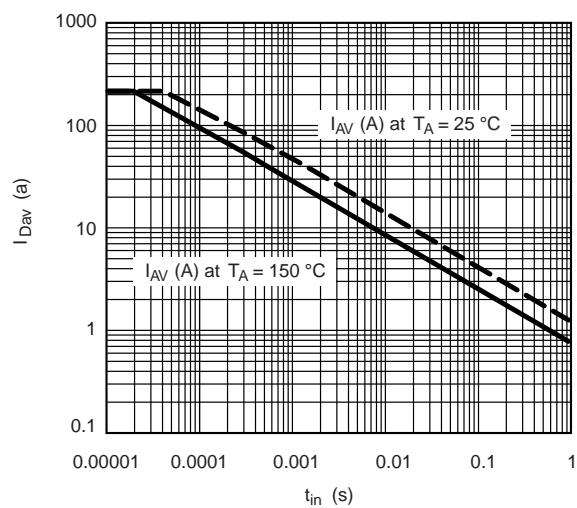
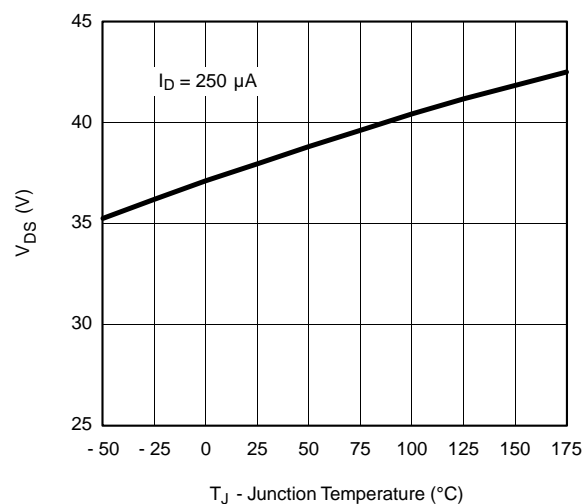
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 40			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1.0		- 2.5	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 40 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 40 V, V _{GS} = 0 V, T _J = 125 °C			- 50	
		V _{DS} = - 40 V, V _{GS} = 0 V, T _J = 175 °C			- 250	
On-State Drain Current ^a	I _{D(on)}	V _{DS} = - 5 V, V _{GS} = - 10 V	- 120			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 30 A		0.010		Ω
		V _{GS} = - 10 V, I _D = - 30 A, T _J = 125 °C		0.016		
		V _{GS} = - 10 V, I _D = - 30 A, T _J = 175 °C		0.023		
		V _{GS} = - 4.5 V, I _D = - 20 A		0.014		
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 75 A	20			S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = - 25 V, f = 1 MHz		3000		pF
Output Capacitance	C _{oss}			620		
Reversen Transfer Capacitance	C _{rss}			315		
Total Gate Charge ^c	Q _g	V _{DS} = - 15 V, V _{GS} = - 10 V, I _D = - 75 A		160		nC
Gate-Source Charge ^c	Q _{gs}			32		
Gate-Drain Charge ^c	Q _{gd}			30		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = - 15 V, R _L = 0.2 Ω I _D ≡ - 75 A, V _{GEN} = - 10 V, R _g = 2.5 Ω		25	40	ns
Rise Time ^c	t _r			225	360	
Turn-Off Delay Time ^c	t _{d(off)}			150	240	
Fall Time ^c	t _f			210	340	
Source-Drain Diode Ratings and Characteristics ^b (T _C = 25 °C)						
Continuous Current	I _S			- 220		A
Pulsed Current	I _{SM}				- 240	
Forward Voltage ^a	V _{SD}	I _F = - 75 A, V _{GS} = 0 V		- 1.2	- 1.5	V
Reverse Recovery Time	t _{rr}	I _F = - 75 A, dI/dt = 100 A/μs		55	100	ns
Peak Reverse Recovery Current	I _{RM(REC)}			2.5	5	A
Reverse Recovery Charge	Q _{rr}			0.07	0.25	μC

Notes:

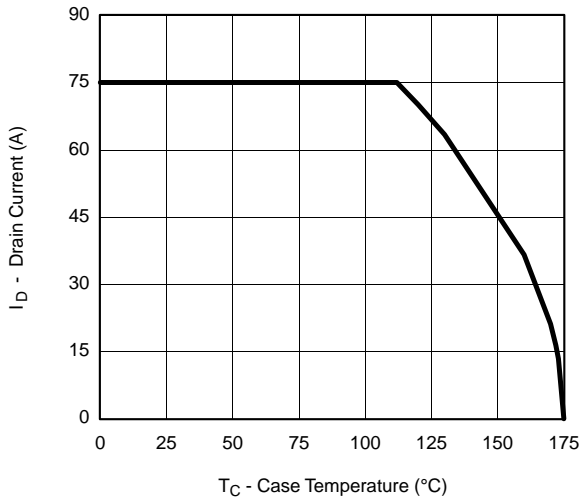
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

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.

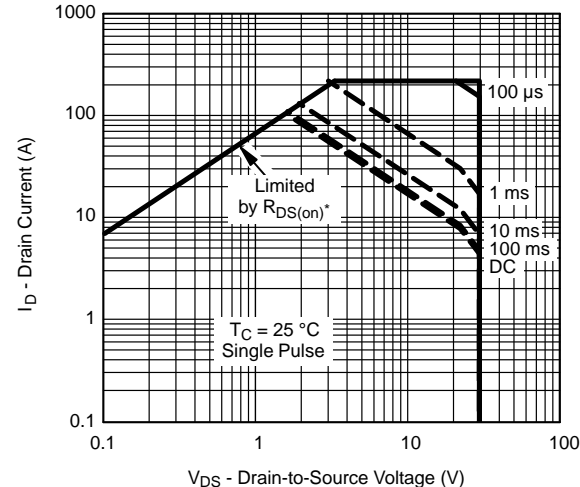
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

On-Resistance vs. Junction Temperature

Source-Drain Diode Forward Voltage

Avalanche Current vs. Time

**Drain Source Breakdown
vs. Junction Temperature**

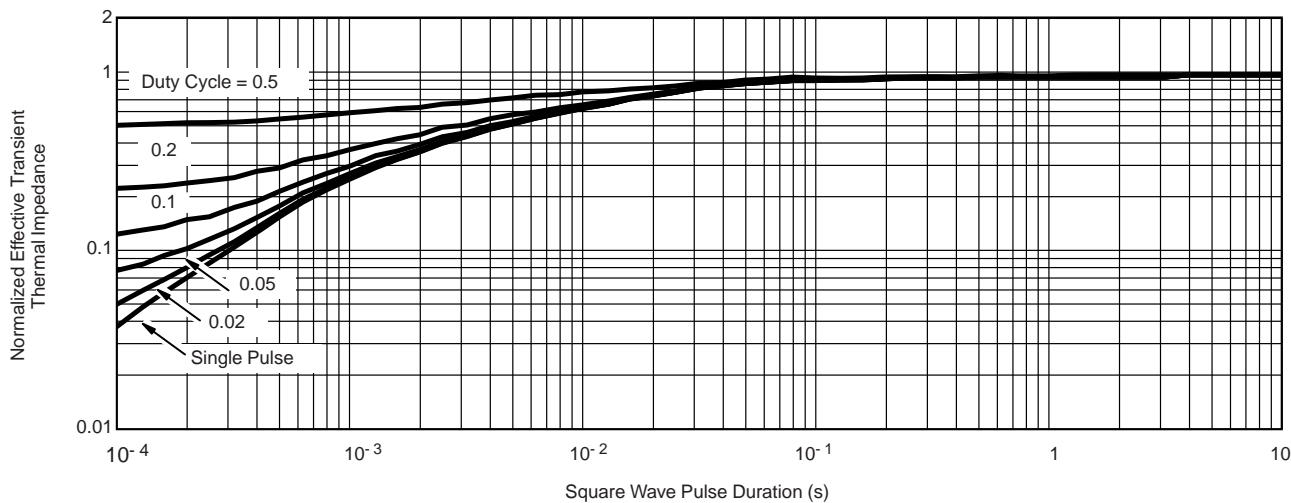
THERMAL RATINGS



**Maximum Avalanche and Drain Current
vs. Case Temperature**

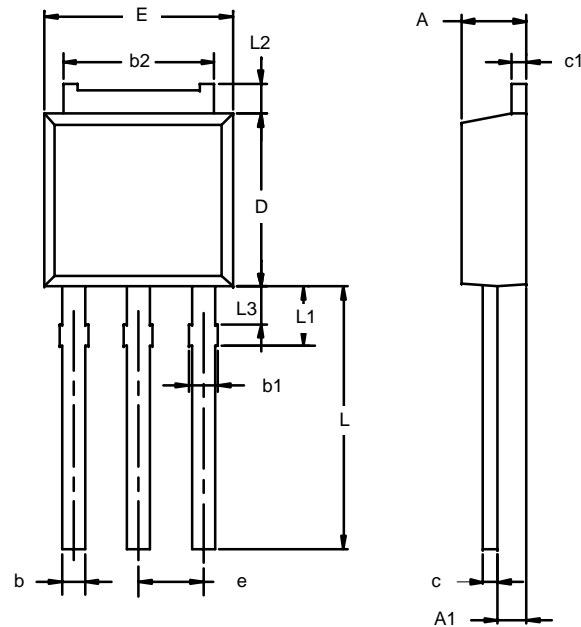


*** $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified
Safe Operating Area**



Normalized Thermal Transient Impedance, Junction-to-Case

TO-251AA (DPAK)



Note: Dimension L3 is for reference only.

Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	2.21	2.38	0.087	0.094
A1	0.89	1.14	0.035	0.045
b	0.71	0.89	0.028	0.035
b1	0.76	1.14	0.030	0.045
b2	5.23	5.43	0.206	0.214
c	0.46	0.58	0.018	0.023
c1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
E	6.48	6.73	0.255	0.265
e	2.28 BSC		0.090 BSC	
L	8.89	9.53	0.350	0.375
L1	1.91	2.28	0.075	0.090
L2	0.89	1.27	0.035	0.050
L3	1.15	1.52	0.045	0.060
ECN: S-03946—Rev. E, 09-Jul-01 DWG: 5346				

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