

## P-Channel Enhancement Mode MOSFET

### 1. Product Information

#### 1.1 Features

Advanced trench cell design  
Low Thermal Resistance

#### 1.2 Applications

Motor drivers  
DC - DC Converter

#### 1.3 Quick reference

$BV \geq -40\text{ V}$

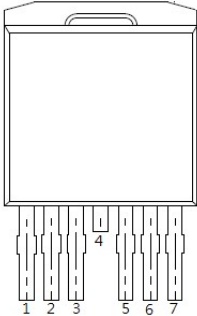
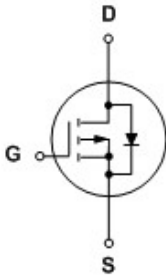
$P_{tot} \cong 375$

$I_D \cong -180\text{ A}$

$R_{DS(ON)} \leq 2.2\text{ m}\Omega @ V_{GS} = -10\text{ V}$

$R_{DS(ON)} \leq 4.2\text{ m}\Omega @ V_{GS} = -4.5\text{ V}$

### 2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Gate(G)	 <p>Top View TO-263-7L</p>	
2,3	Source (S)		
4	Drain(D)		
5,6,7	Source (S)		

### 3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>DS</sub>	Drain-Source Voltage	T <sub>C</sub> = 25 °C	-	- 40	V
V <sub>GS</sub>	Gate-Source Voltage	T <sub>C</sub> = 25 °C	-	± 20	V
I <sub>D</sub> *	Drain Current ( DC )	T <sub>C</sub> = 25 °C, V <sub>GS</sub> = - 10 V	-	- 180	A
		T <sub>C</sub> = 100 °C, V <sub>GS</sub> = - 10 V	-	- 120	A
I <sub>DM</sub> **	Drain Current ( Pulsed )	T <sub>C</sub> = 25 °C, V <sub>GS</sub> = - 10 V	-	- 600	A
P <sub>tot</sub> *	Total Power Dissipation	T <sub>C</sub> = 25 °C	-	375	W
T <sub>stg</sub>	Storage Temperature		- 55	150	°C
T <sub>J</sub>	Junction Temperature		-	150	°C
I <sub>S</sub>	Diode Forward Current	T <sub>C</sub> = 25 °C	-	- 180	A
E <sub>AS</sub> *	Single Pulsed Avalanche Energy	V <sub>DD</sub> = - 30 V , L = 1 mH	-	1568	mJ
R <sub>θJA</sub> *	Thermal Resistance- Junction to Ambient		-	40	°C / W
R <sub>θJC</sub> *	Thermal Resistance- Junction to Case		-	0.4	

Notes :

- \* Surface Mounted on 1 in<sup>2</sup> pad area, t ≤ 10 sec
- \*\* Pulse width ≤ 300 μs, duty cycle ≤ 2 %
- \*\*\* limited by bonding wire

### 4. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
IPB180P04P4L-02	TO263-7L(D2-PAK)			1000	

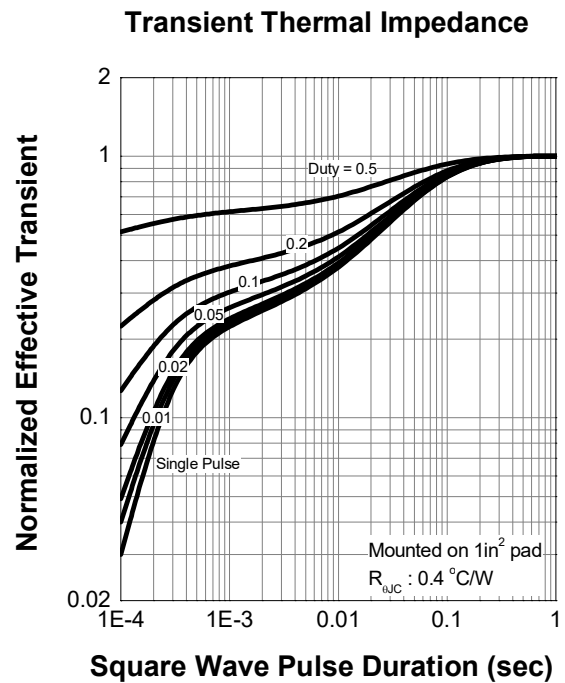
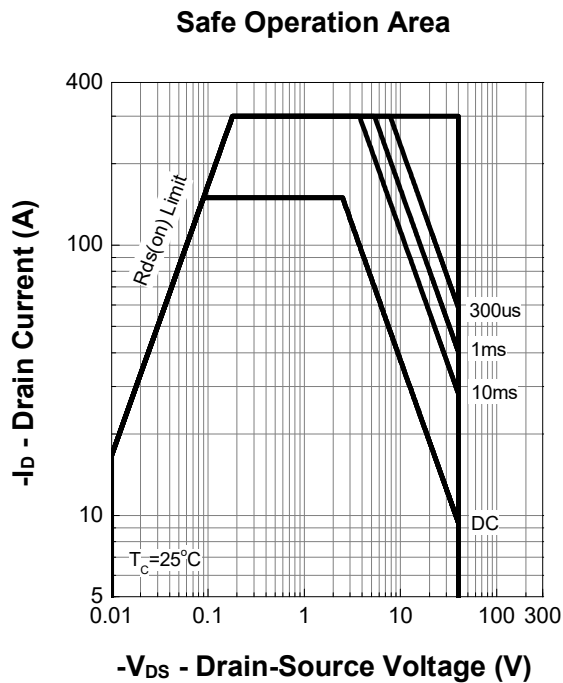
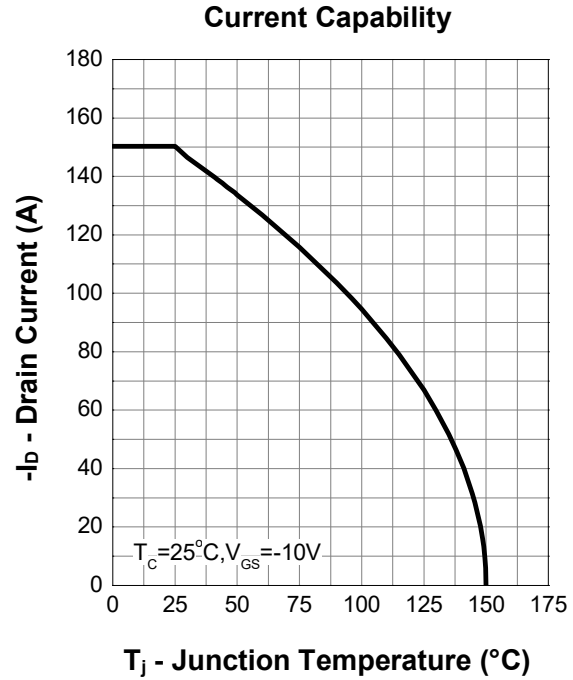
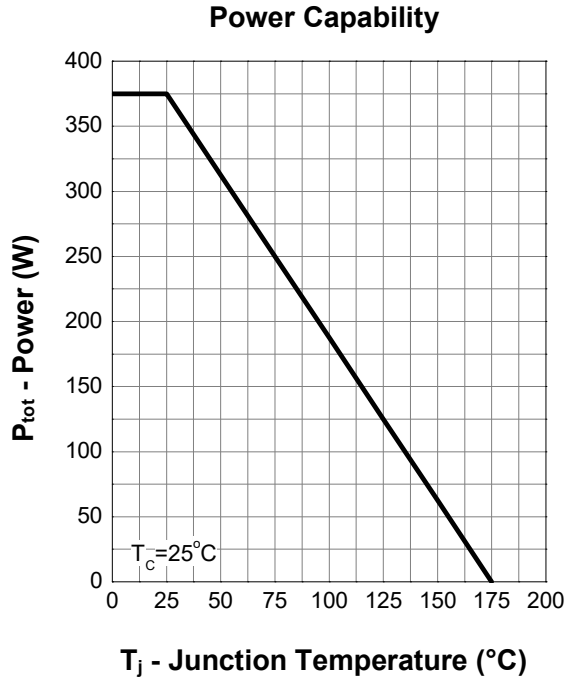
## 5. Electrical Characteristics (T<sub>A</sub> = 25 °C Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = - 250 μA	- 40	-	-	V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = - 250 μA	- 1	-	- 3	V
I <sub>DSS</sub>	Zero Gate Voltage Source Current	V <sub>DS</sub> = - 36 V, V <sub>GS</sub> = 0 V	-	-	- 1	μA
I <sub>GSS</sub>	Gate Leakage Current	V <sub>GS</sub> = ± 20 V, V <sub>DS</sub> = 0 V	-	-	± 100	nA
R <sub>DS(ON)</sub> <sup>a</sup>	Drain-Source On-State Resistance	V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 50 A	-	1.8	2.2	mΩ
		V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 30 A	-	3.8	4.2	
<b>Diode Characteristics</b>						
V <sub>SD</sub> <sup>a</sup>	Diode Forward Voltage	I <sub>SD</sub> = - 50 A, V <sub>GS</sub> = 0 V	-	-	- 1.3	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> = - 30 A, dI <sub>SD</sub> /dt = 100 A/μs	-	37	-	nS
Q <sub>rr</sub>	Reverse Recovery Charge		-	30	-	nC
<b>Dynamic Characteristics<sup>b</sup></b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = - 15 V Frequency = 1 MHz	-	12977	-	pF
C <sub>oss</sub>	Output Capacitance		-	1526	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	517	-	
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> = - 15 V, V <sub>GEN</sub> = - 10 V, R <sub>G</sub> = 3.9 Ω, R <sub>L</sub> = 0.3 Ω, I <sub>DS</sub> = - 50 A	-	21	-	nS
t <sub>r</sub>	Turn-on Rise Time		-	195	-	
t <sub>d(off)</sub>	Turn-off Delay Time		-	177	-	
t <sub>f</sub>	Turn-off Fall Time		-	109	-	
<b>Gate Charge Characteristics<sup>b</sup></b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = - 10 V, I <sub>DS</sub> = - 50 A	-	212	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	60	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	35	-	

Notes :

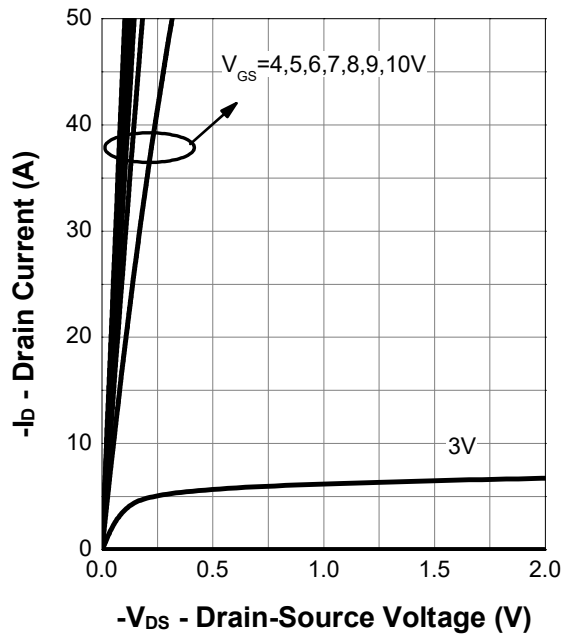
- a : Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2 %
- b : Guaranteed by design, not subject to production testing

## 6. Typical Characteristics (Cont.)

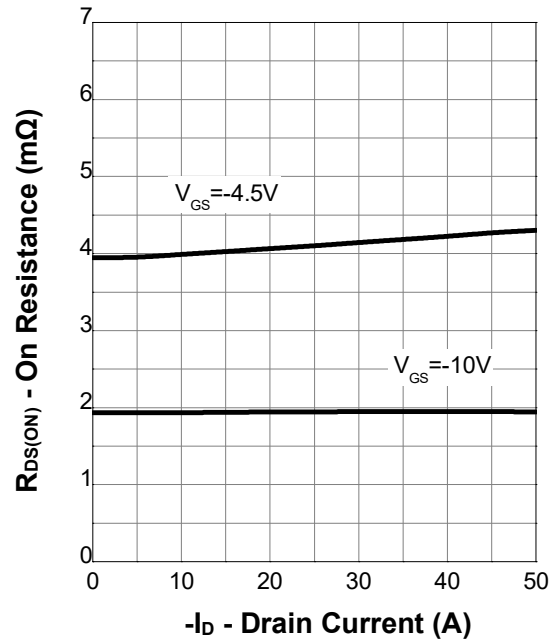


## 6. Typical Characteristics (Cont.)

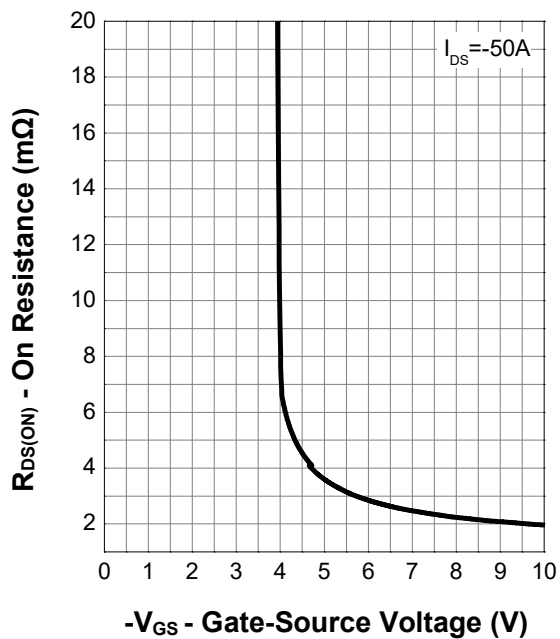
Output Characteristics



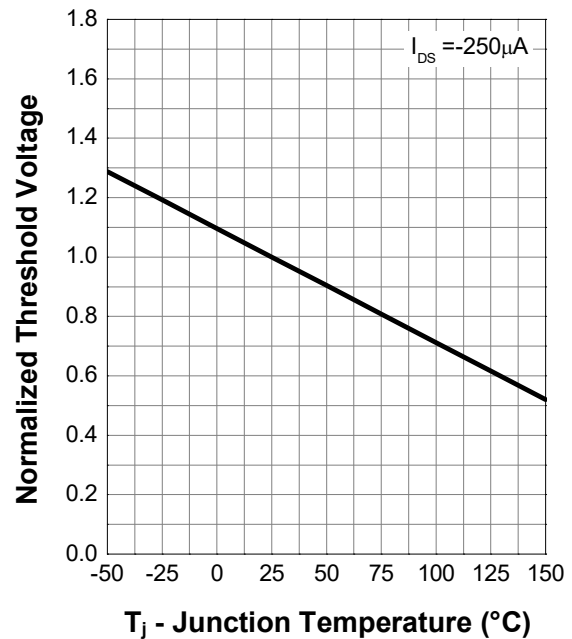
On Resistance



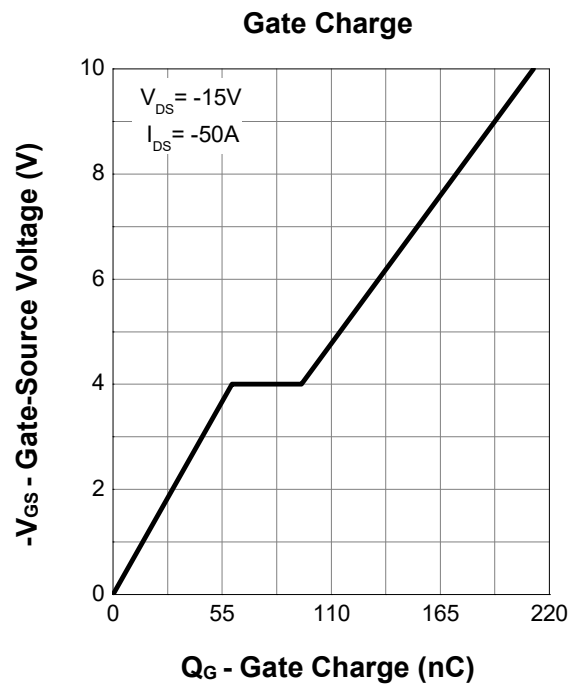
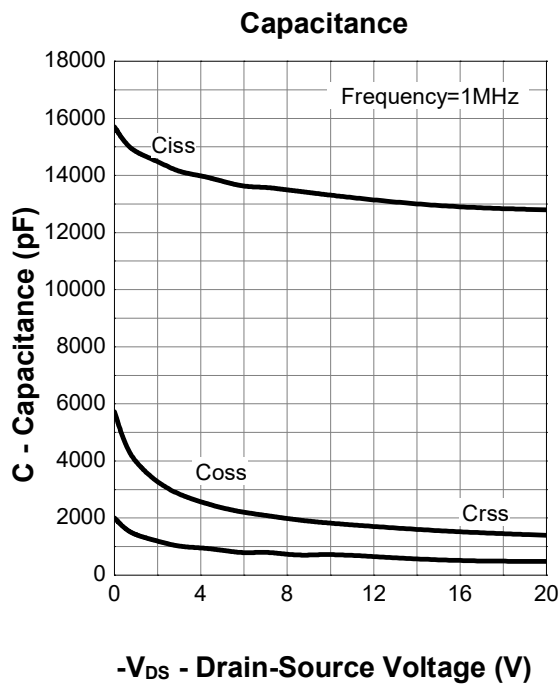
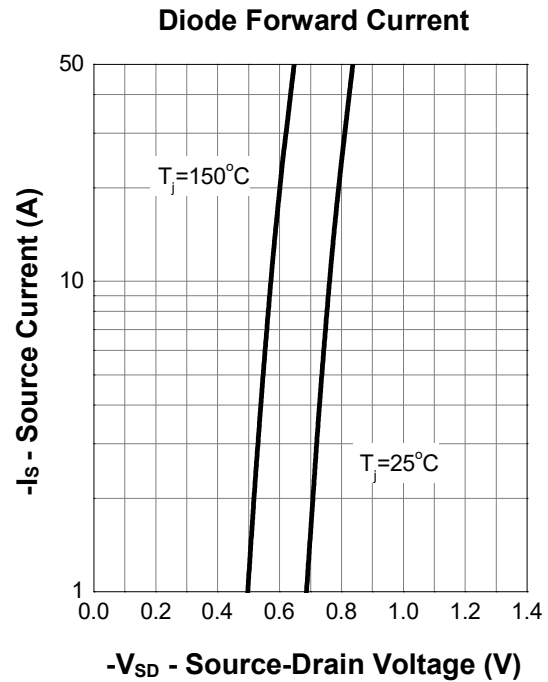
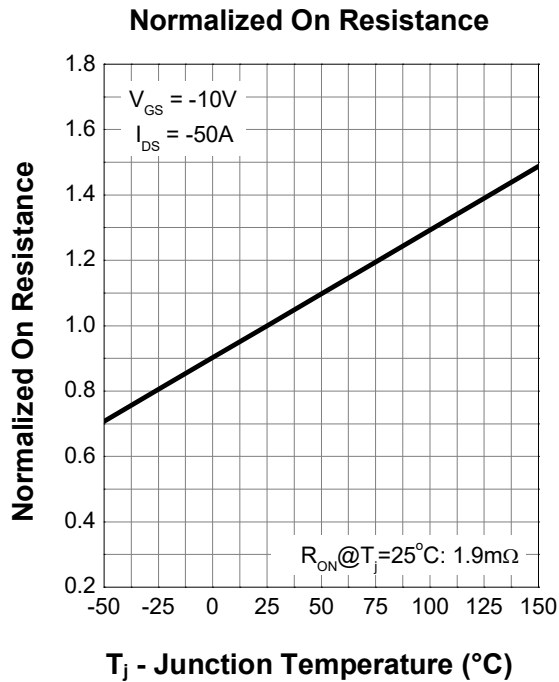
Transfer Characteristics



Normalized Threshold Voltage

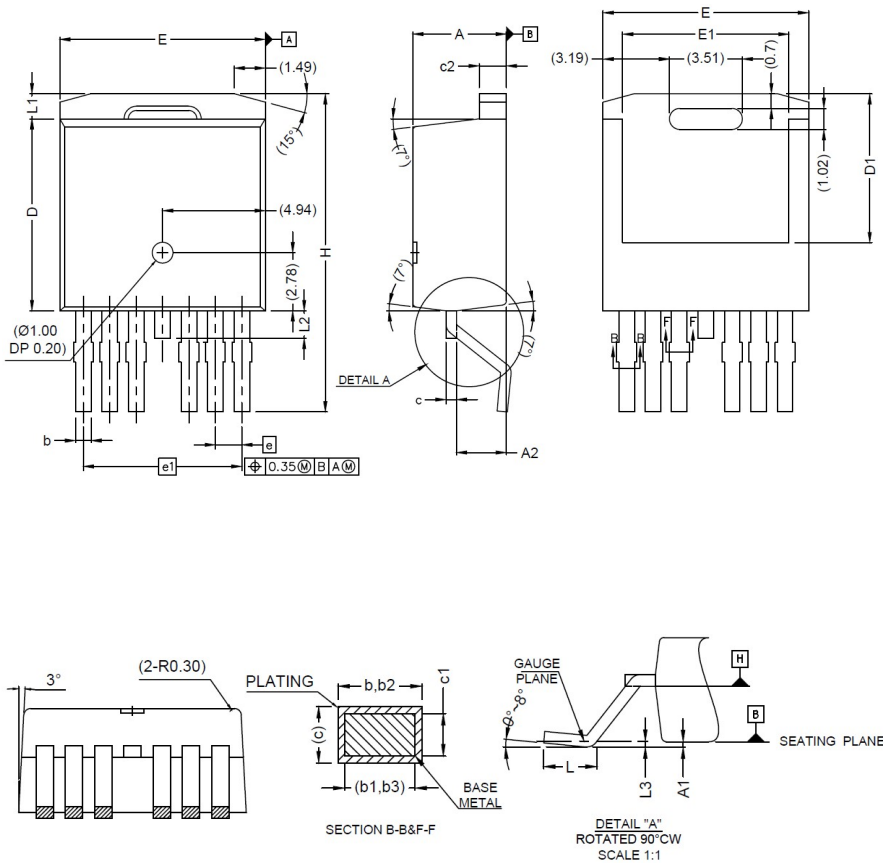


## 6. Typical Characteristics (Cont.)



## 7. Package Dimensions

### TO-263-7L Package



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	4.30	4.70
A1	-	0.25
A2	2.20	2.60
b	0.65	0.85
b1	0.65	0.80
b2	0.80	1.00
b3	0.80	0.95
c	0.45	0.60
c1	0.45	0.55
c2	1.25	1.40
D	9.00	9.40
D1	6.86	7.42
E	9.68	10.08
E1	7.70	8.30
e	1.27 BSC	
e1	7.62 BSC	
L	1.78	2.79
L1	-	1.60
L2	-	1.78
L3	0.25BSD	
H	14.61	15.88

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