

Complementary Enhancement Mode MOSFET

1. Product Information

1.1 Features

- ☑ Surface-mounted package
- ☑ Advanced trench cell design

1.2 Applications

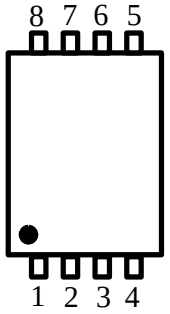
- ☑ MB and NB
- ☑ Half – bridge Drivers
- ☑ Motor drivers

1.3 Quick reference

N-channel	P-channel
☑ BV ≧ 30 V	☑ BV ≧ - 30 V
☑ P_{tot} ≦ 20.8 W	☑ P_{tot} ≦ 20.8 W
☑ I_D ≦ 40 A	☑ I_D ≦ - 24.5 A
☑ $R_{DS(ON)}$ ≦ 8.5 mΩ @ V_{GS} = 10 V	☑ $R_{DS(ON)}$ ≦ 23 mΩ @ V_{GS} = - 10 V
$R_{DS(ON)}$ ≦11.5 mΩ @ V_{GS} = 4.5 V	$R_{DS(ON)}$ ≦ 34 mΩ @ V_{GS} = - 4.5 V

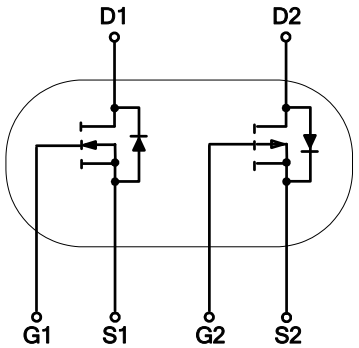
2. Pin Description

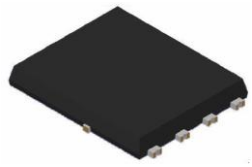
Pin	Description
1	Source(S1)
2	Gate(G1)
3	Source(S2)
4	Gate(G2)
5,6	Drain(D2)
7,8	Drain(D1)



Top View

PDFN5x6-8L





3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
N-channel					
V_{DS}	Drain-Source Voltage	T_C = 25 ℃	-	30	V
V_{GS}	Gate-Source Voltage	T_C = 25 ℃	-	± 20	V
I_D*	Drain Current	T_C = 25 ℃, V_{GS} = 10 V	-	40	A
		T_C = 100 ℃, V_{GS} = 10 V	-	25	A
		T_A = 25 ℃, V_{GS} = 10 V	-	14	A
		T_A = 70 ℃, V_{GS} = 10 V	-	11	A
I_{DM}*,**,***	Pulsed Drain Current	T_C = 25 ℃, V_{GS} = 10 V	-	160	A
P-channel					
V_{DS}	Drain-Source Voltage	T_C = 25 ℃	-	- 30	V
V_{GS}	Gate-Source Voltage	T_C = 25 ℃	-	± 20	V
I_D*	Drain Current	T_C = 25 ℃, V_{GS} = - 10 V	-	- 24.5	A
		T_C = 100 ℃, V_{GS} = - 10 V	-	- 15.5	A
		T_A = 25 ℃, V_{GS} = - 10 V	-	- 8.8	A
		T_A = 70 ℃, V_{GS} = - 10 V	-	- 7	A
I_{DM}*,**	Pulsed Drain Current	T_C = 25 ℃, V_{GS} = - 10 V	-	- 98	A
P_{tot}	Total Power Dissipation	T_C = 25 ℃	-	20.8	W
T_{stg}	Storage Temperature		- 55	150	℃
T_J	Junction Temperature		- 55	150	℃
$R_{\theta JA}$*	Thermal Resistance- Junction to Ambient		-	45.5	℃ / W
$R_{\theta JC}$*	Thermal Resistance- Junction to Case		-	6	℃ / W

Notes：

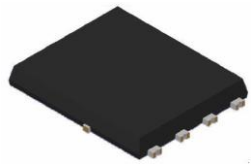
* Surface Mounted on 1 in^2 pad area, t ≤ 10 sec

** Pulse width ≤ 300 μs, duty cycle ≤ 2 %

*** limited by bonding wire

4. Marking Information

Product Name	Marking	
iM1706A	iM1706 XXXXX	X : Date Code



5. Electrical Characteristics (T_A = 25 °C Unless Otherwise Noted)

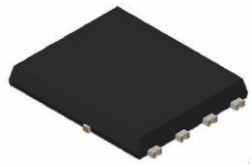
N-channel:

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 µA	30	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_{DS} = 250 µA	1	-	2.5	V
I_{DSS}	Zero Gate Voltage Source Current	V_{DS} = 24 V, V_{GS} = 0 V	-	-	1	µA
I_{GSS}	Gate Leakage Current	V_{GS} = ± 20 V, V_{DS} = 0 V	-	-	± 100	nA
$R_{DS(ON)}$[a]	Drain-Source On-State Resistance	V_{GS} = 10 V, I_D =20 A	-	7	8.5	mΩ
		V_{GS} = 4.5 V, I_D = 10 A	-	9	11.5	
Diode Characteristics						
V_{SD}[a]	Diode Forward Voltage	I_{SD} = 20 A, V_{GS} = 0 V	-	-	1.3	V
t_{rr}	Reverse Recovery Time	I_{SD} = 20 A, dI_{SD}/dt = 100 A/µs	-	12	-	nS
Q_{rr}	Reverse Recovery Charge		-	4.3	-	nC
Dynamic Characteristics[b]						
C_{iss}	Input Capacitance	V_{GS} = 0 V, V_{DS} = 15 V Frequency = 1 MHz	-	2588	-	pF
C_{oss}	Output Capacitance		-	216	-	
C_{rss}	Reverse Transfer Capacitance		-	175	-	
t_d(on)	Turn-on Delay Time	V_{DS} = 15 V, V_{GEN} = 10 V, R_G = 4.5 Ω, R_L = 1.75Ω, I_D = 20 A	-	8.8	-	nS
t_r	Turn-on Rise Time		-	49	-	
t_d(off)	Turn-off Delay Time		-	38	-	
t_f	Turn-off Fall Time		-	20	-	
Gate Charge Characteristics[b]						
Q_g	Total Gate Charge	V_{GS} = 10 V, V_{DS} = 15 V, I_{DS} = 20 A	-	48	-	nC
Q_{gs}	Gate-Source Charge		-	10	-	
Q_{gd}	Gate-Drain Charge		-	6.9	-	

Notes :

a : Pulse test ; pulse width ≤ 300 µs, duty cycle ≤ 2 %

b : Guaranteed by design, not subject to production testing



6. Electrical Characteristics (T_A = 25 °C Unless Otherwise Noted)

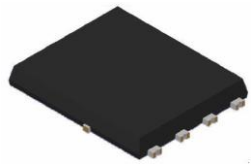
P-channel:

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = - 250 µA	- 30	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_{DS} = - 250 µA	- 1	-	- 2.5	V
I_{DSS}	Zero Gate Voltage Source Current	V_{DS} = - 24 V, V_{GS} = 0 V	-	-	- 1	µA
I_{GSS}	Gate Leakage Current	V_{GS} = ± 20 V, V_{DS} = 0 V	-	-	± 100	nA
$R_{DS(ON)}$[a]	Drain-Source On-State Resistance	V_{GS} = - 10 V, I_D = - 20 A	-	18	23	mΩ
		V_{GS} = - 4.5 V, I_D = - 10 A	-	26	34	
Diode Characteristics						
V_{SD}[a]	Diode Forward Voltage	I_{SD} = - 20 A, V_{GS} = 0 V	-	-	- 1.3	V
t_{rr}	Reverse Recovery Time	I_{SD} = - 20 A, dI_{SD}/dt = 100 A/µs	-	12	-	nS
Q_{rr}	Reverse Recovery Charge		-	4.8	-	nC
Dynamic Characteristics[b]						
C_{iss}	Input Capacitance	V_{GS} = 0 V, V_{DS} = - 15 V Frequency = 1 MHz	-	1933	-	pF
C_{oss}	Output Capacitance		-	179	-	
C_{rss}	Reverse Transfer Capacitance		-	149	-	
t_d(on)	Turn-on Delay Time	V_{DS} = - 15 V, V_{GEN} = - 10 V, R_G = 3.9 Ω, R_L = 0.75 Ω, I_D = - 20 A	-	19	-	nS
t_r	Turn-on Rise Time		-	92	-	
t_d(off)	Turn-off Delay Time		-	265	-	
t_f	Turn-off Fall Time		-	139	-	
Gate Charge Characteristics[b]						
Q_g	Total Gate Charge	V_{GS} = - 10 V, V_{DS} = - 15 V, I_{DS} = - 20 A	-	33	-	nC
Q_{gs}	Gate-Source Charge		-	9.3	-	
Q_{gd}	Gate-Drain Charge		-	4.4	-	

Notes :

a : Pulse test ; pulse width ≤ 300 µs, duty cycle ≤ 2 %

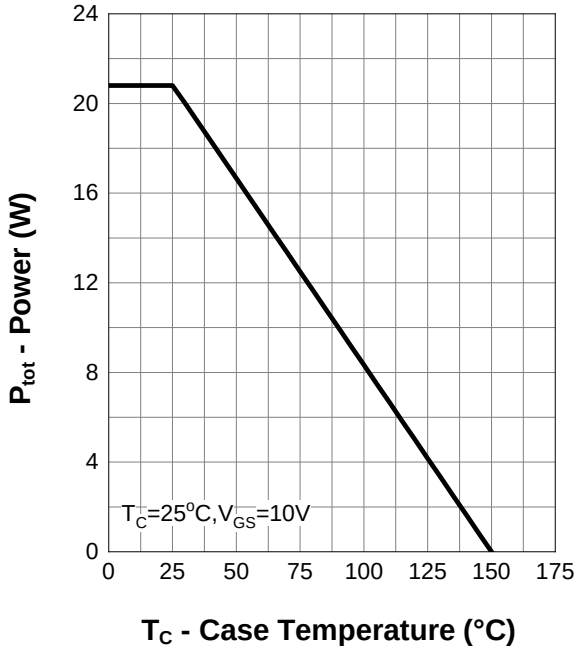
b : Guaranteed by design, not subject to production testing



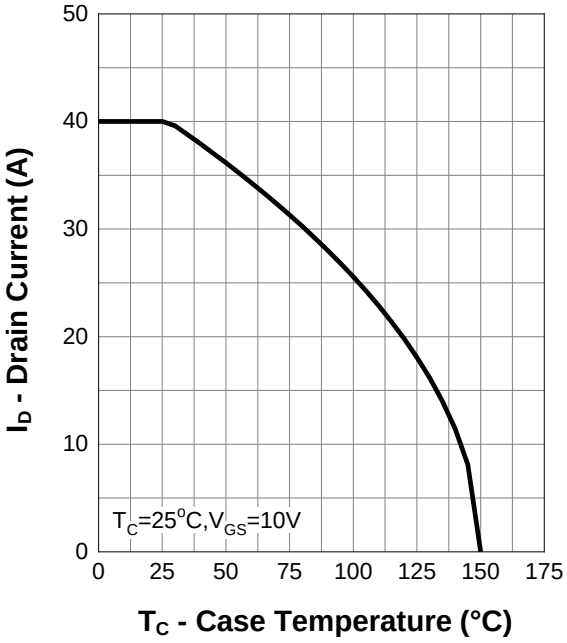
7. Typical Characteristics (Cont.)

N-channel:

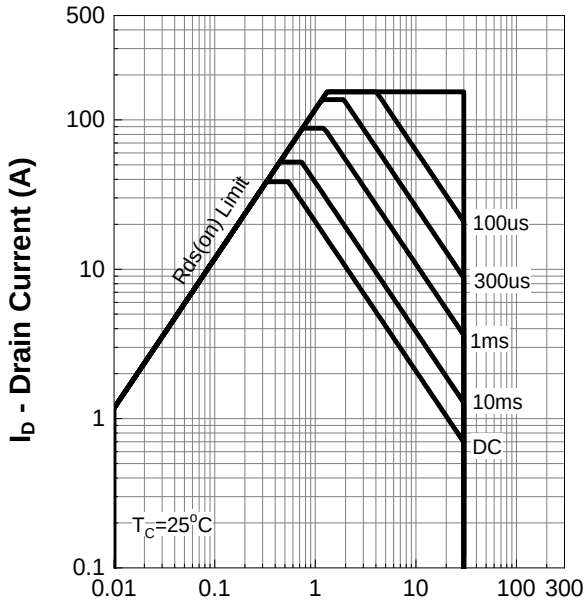
Power Capability



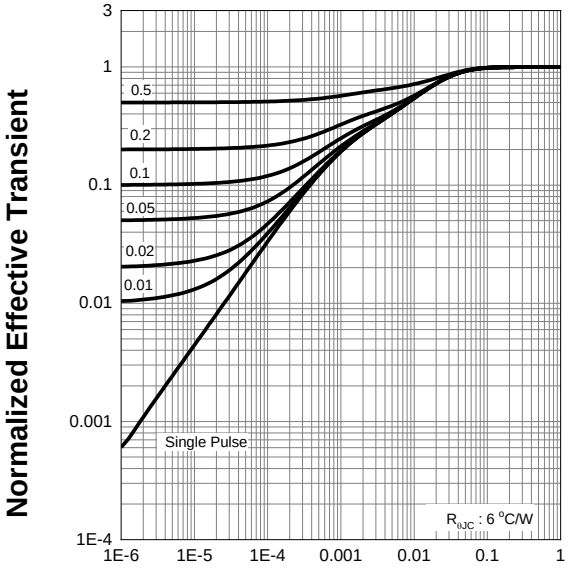
Current Capability

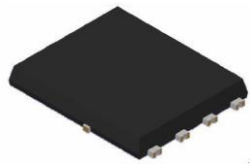


Safe Operation Area



Transient Thermal Impedance

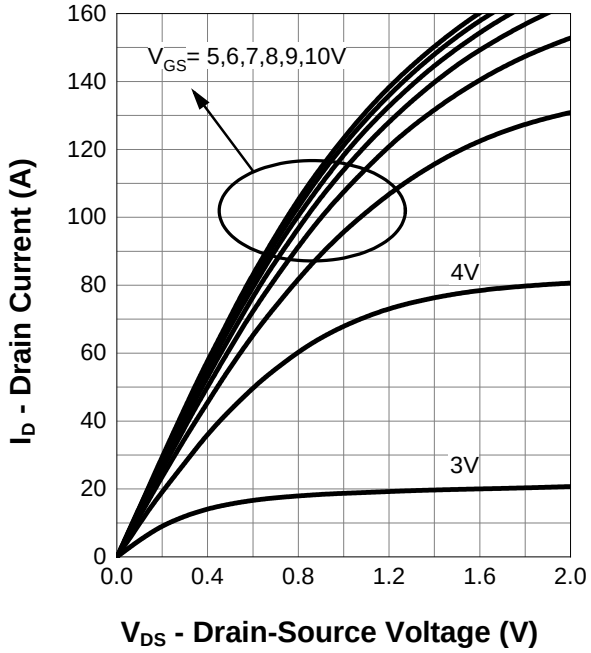




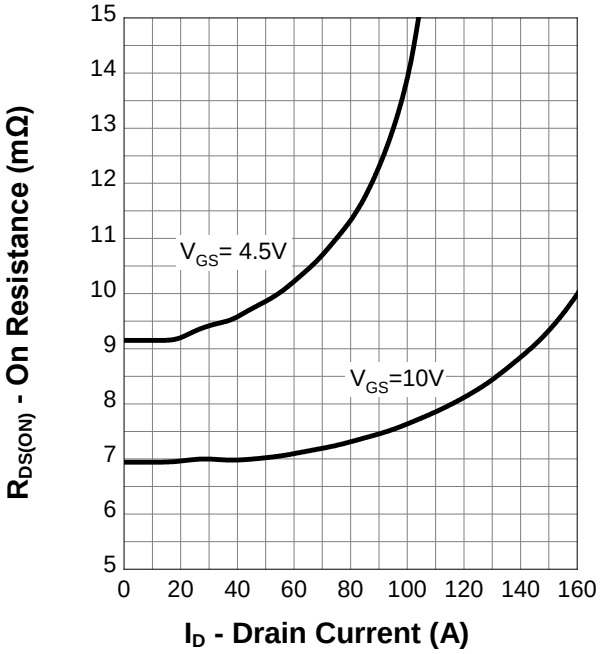
7. Typical Characteristics (Cont.)

N-channel:

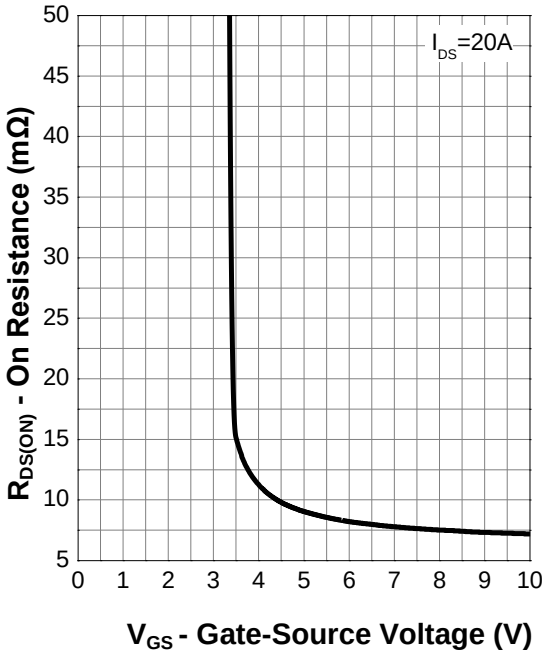
Output Characteristics



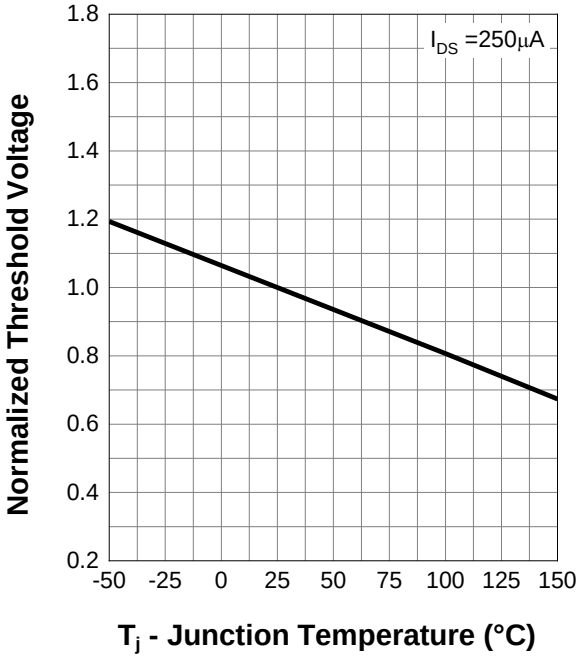
On Resistance

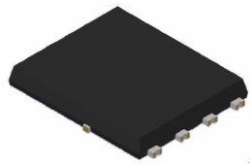


Transfer Characteristics



Normalized Threshold Voltage

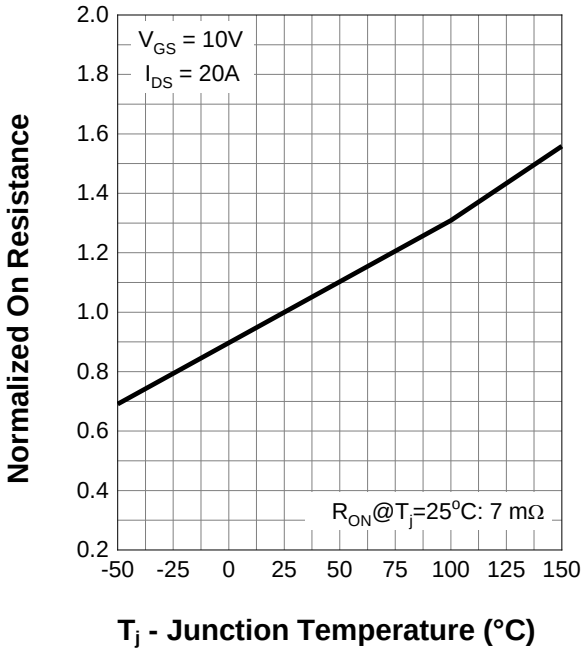




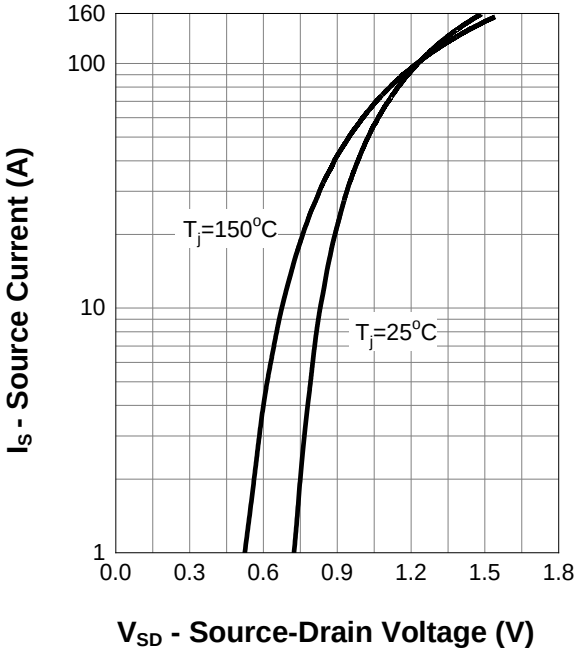
7. Typical Characteristics (Cont.)

N-channel:

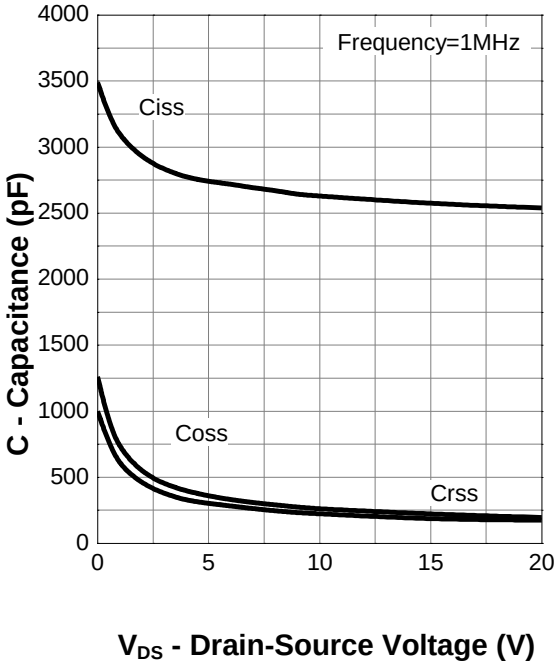
Normalized On Resistance



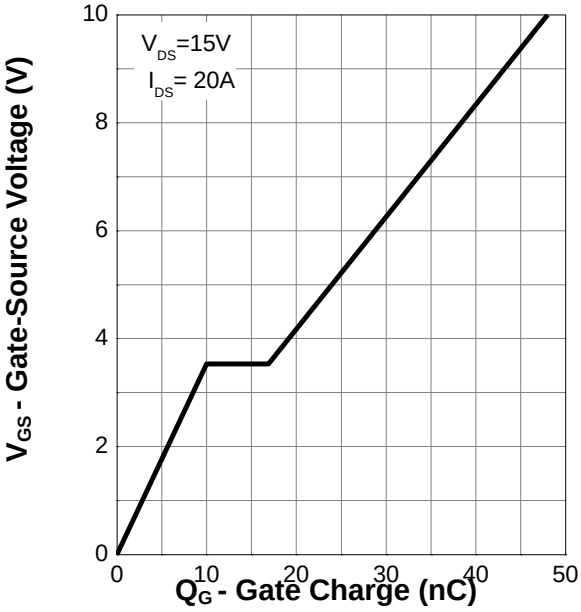
Diode Forward Current

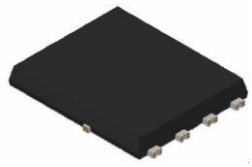


Capacitance



Gate Charge

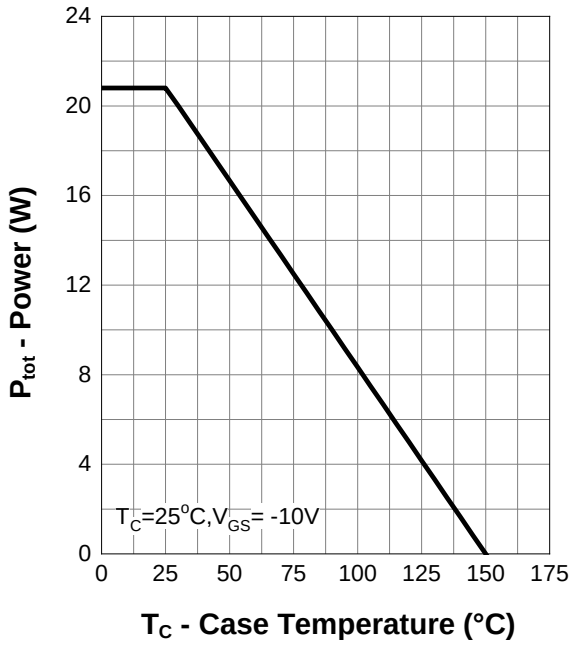




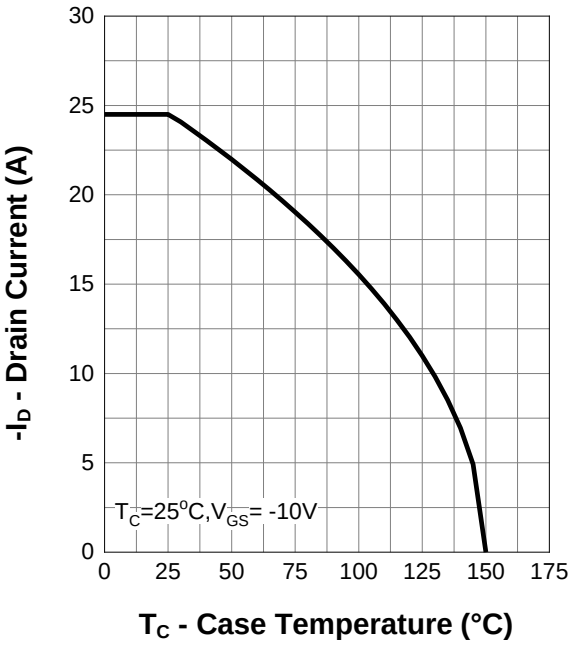
7. Typical Characteristics (Cont.)

P-channel:

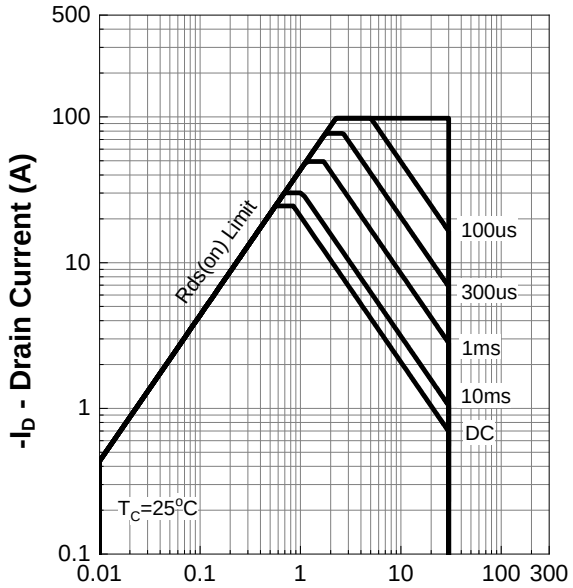
Power Capability



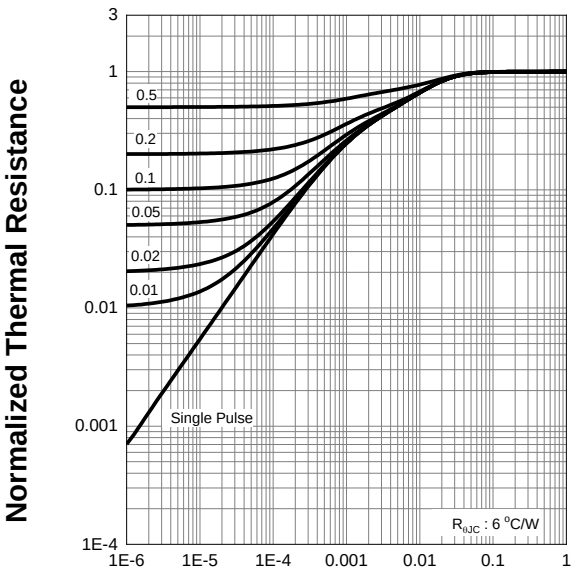
Current Capability

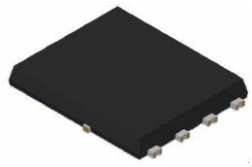


Safe Operation Area



Transient Thermal Impedance

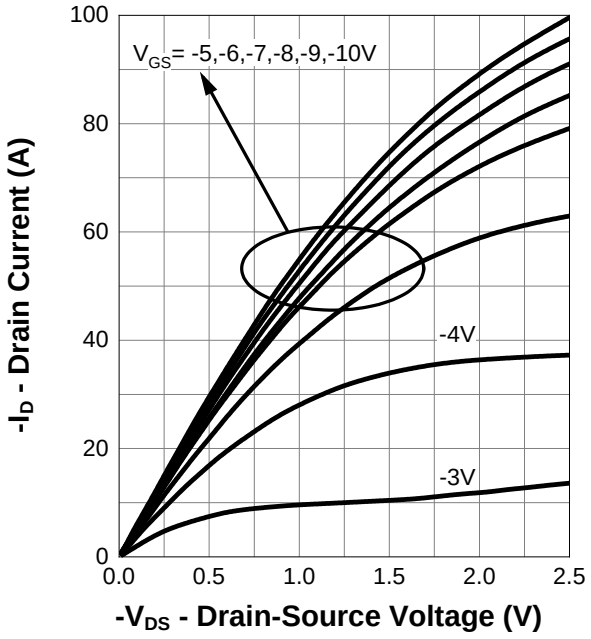




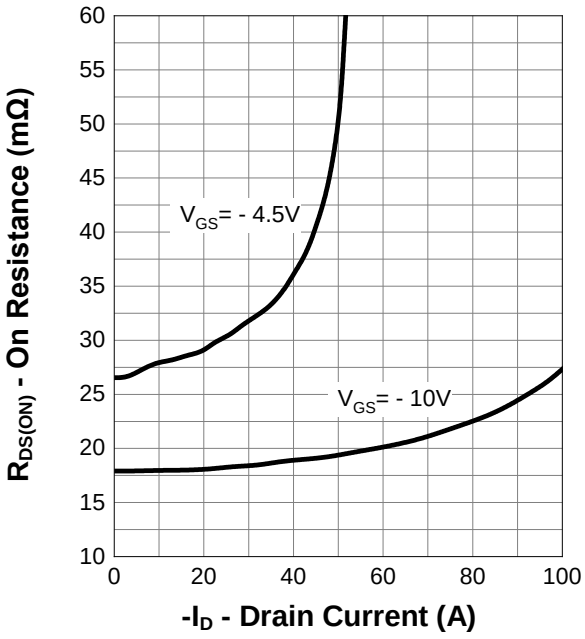
7. Typical Characteristics (Cont.)

P-channel:

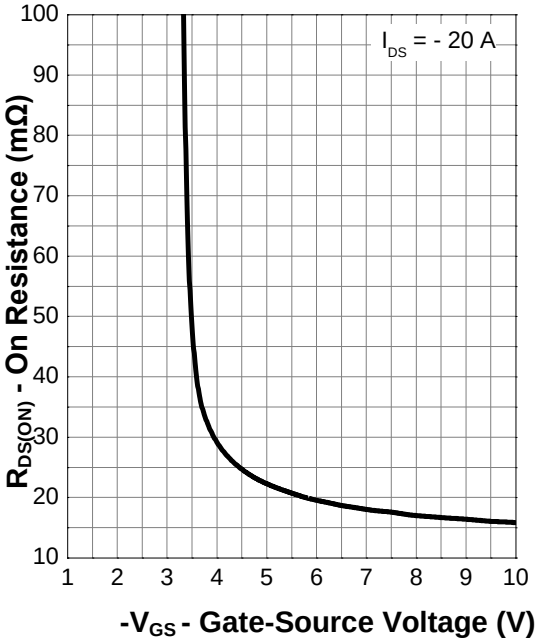
Output Characteristics



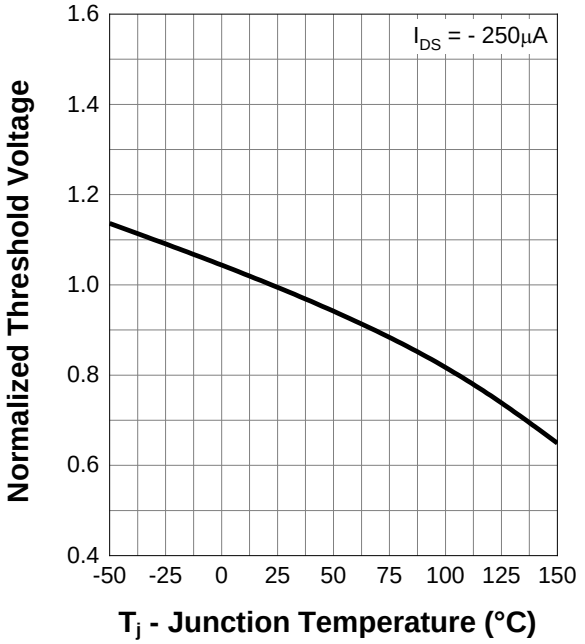
Drain-Source On Resistance

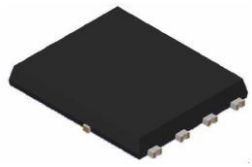


Transfer Characteristics



Normalized Threshold Voltage

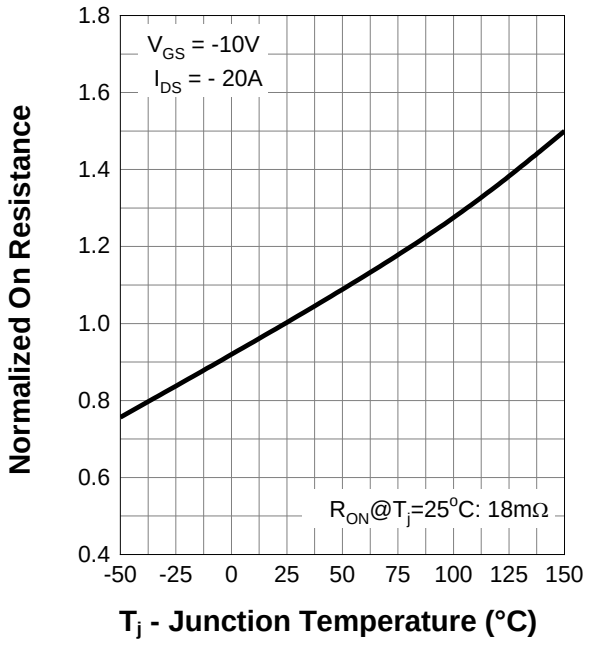




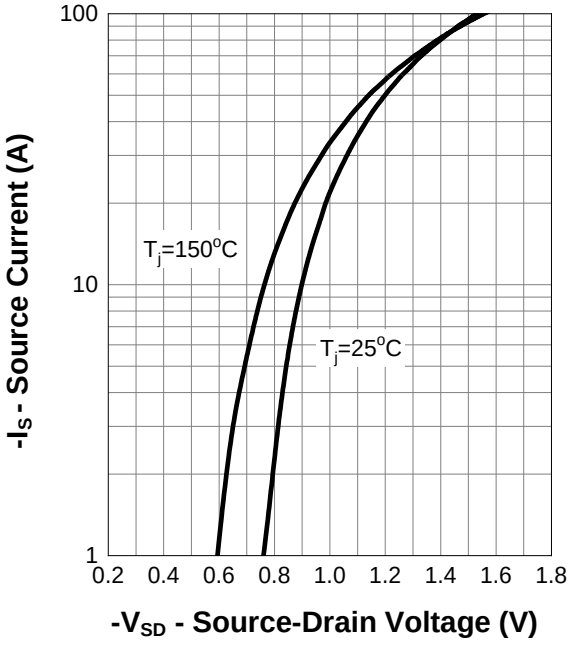
7. Typical Characteristics (Cont.)

P-channel:

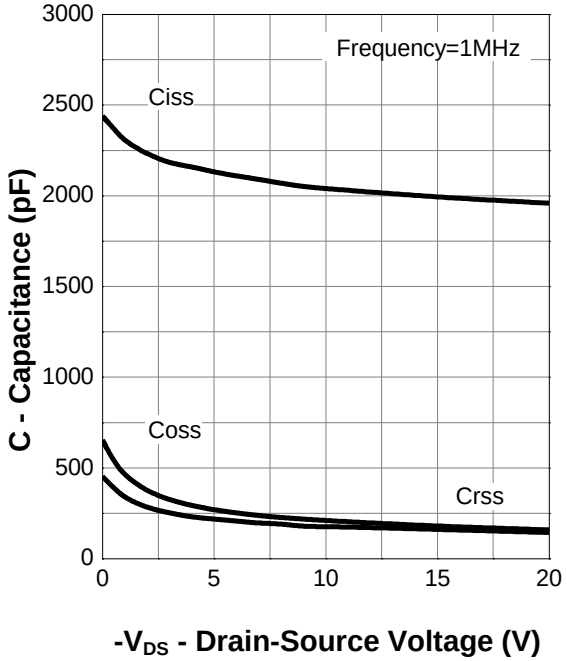
Normalized On Resistance



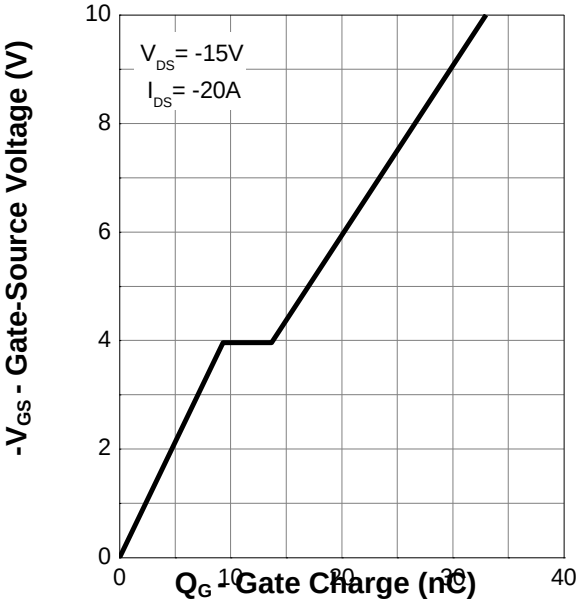
Diode Forward Current

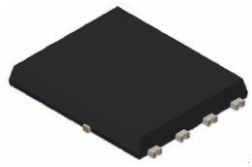


Capacitance



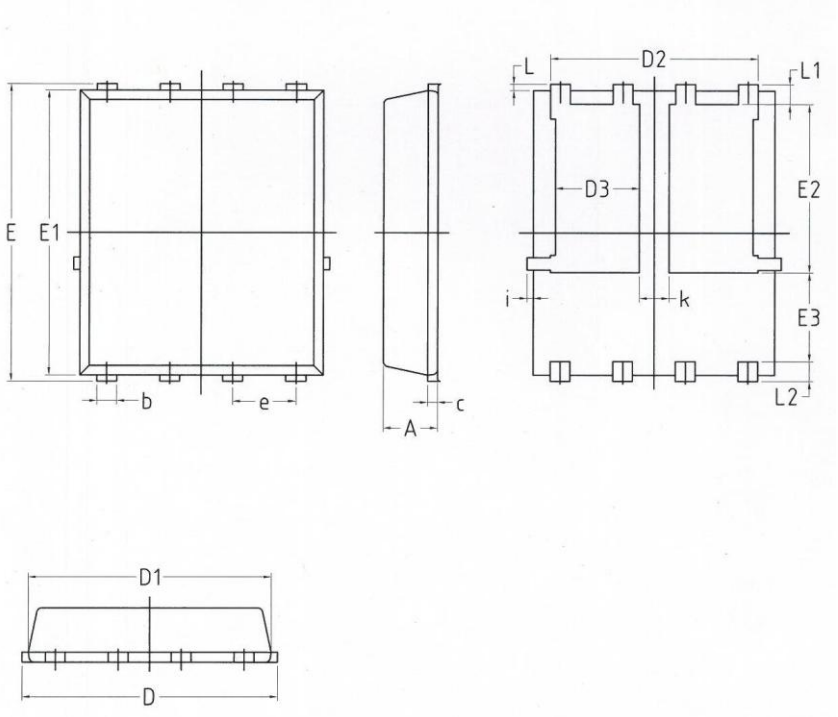
Gate Charge





8. Package Dimensions

PDFN5x6 - 8L (Dual) Package



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	1.03	1.17
B	0.34	0.48
c	0.203 BSC	
D	4.8	5.4
D1	4.8	5.0
D2	4.11	4.31
D3	1.6	1.8
E	5.95	6.15
E1	5.65	5.85
E2	3.3	3.5
E3	1.7	-
e	1.27 BSC	
L	0.05	0.25
L1	0.38	0.5
L2	0.38	0.5
i	-	0.18
k	0.5	0.7