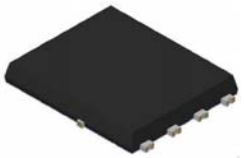
iM1704A



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

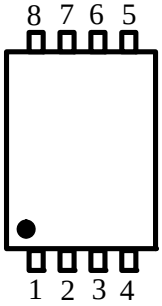
- ☑ BV ≧ 40 V
- ☑ P_{tot} ≦ 18.9 W
- ☑ I_D ≦ 28 A
- ☑ $R_{DS(ON)}$ ≦ 13 mΩ @ V_{GS} = 10 V
  $R_{DS(ON)}$ ≦ 18 mΩ @ V_{GS} = 4.5 V

P-channel

- ☑ BV ≧ - 40 V
- ☑ P_{tot} ≦ 18.9 W
- ☑ I_D ≦ - 18 A
- ☑ $R_{DS(ON)}$ ≦ 34 mΩ @ V_{GS} = - 10 V
  $R_{DS(ON)}$ ≦ 53mΩ @ V_{GS} = - 4.5 V

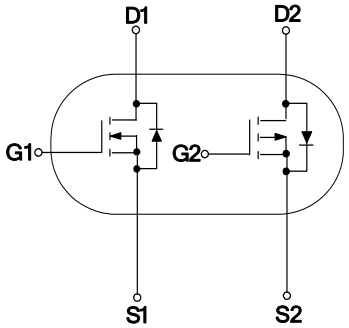
2. Pin Description

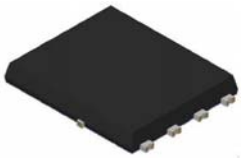
Pin	Description
1	Source(S1)
2	Gate(G1)
3	Source(S2)
4	Gate(G2)
5,6	Drain(D2)
7,8	Drain(D1)



Top View

PDFN5x6-8L





3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
N-channel					
V_{DS}	Drain-Source Voltage	T_C = 25 ℃	-	40	V
V_{GS}	Gate-Source Voltage	T_C = 25 ℃	-	± 20	V
I_D*	Drain Current (DC)	T_C = 25 ℃, V_{GS} = 10 V	-	28	A
		T_C = 100 ℃, V_{GS} = 10 V	-	17	A
I_{DM}*,**,***	Drain Current (Pulsed)	T_C = 25 ℃, V_{GS} = 10 V	-	72	A
P-channel					
V_{DS}	Drain-Source Voltage	T_C = 25 ℃	-	- 40	V
V_{GS}	Gate-Source Voltage	T_C = 25 ℃	-	± 20	V
I_D*	Drain Current	T_C = 25 ℃, V_{GS} = - 10 V	-	- 18	A
		T_C = 100 ℃, V_{GS} = - 10 V	-	- 11	A
I_{DM}*,**	Pulsed Drain Current	T_C = 25 ℃, V_{GS} = - 10 V	-	- 72	A
P_{tot}	Total Power Dissipation	T_C = 25 ℃	-	18.9	W
T_{stg}	Storage Temperature		- 55	150	℃
T_J	Junction Temperature		- 55	150	℃
$R_{\theta JA}$*	Thermal Resistance- Junction to Ambient		-	55	℃ / W
$R_{\theta JC}$*	Thermal Resistance- Junction to Ambient		-	6.6	℃ / W

Notes :

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

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

*** limited by bonding wire

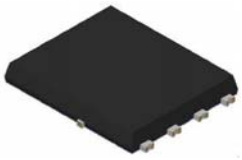
4. Marking Information

Product Name	Marking
iM1704A	iM1704 XXXXX X : Date Code

5. Ordering Code

iM1704A	Assembly Material: Halogen and Lead Free Device

Note: inergy defines " Green " as lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900 ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500 ppm by weight; Follow IEC 61249-2-21 and IPC / JEDEC J-STD-020C)



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

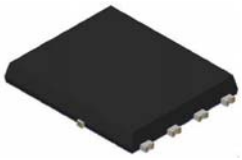
N-channel:

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 µA	40	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_{DS} = 250 µA	1.0	-	2.0	V
I_{DSS}	Zero Gate Voltage Source Current	V_{DS} = 32 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	-	10	13	mΩ
		V_{GS} = 4.5 V, I_D = 10 A	-	14	18	
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	-	7	-	nS
Q_{rr}	Reverse Recovery Charge		-	2.6	-	nC
Dynamic Characteristics[b]						
C_{iss}	Input Capacitance	V_{GS} = 0 V, V_{DS} = 20 V Frequency = 1 MHz	-	1584	-	pF
C_{oss}	Output Capacitance		-	113	-	
C_{rss}	Reverse Transfer Capacitance		-	95	-	
t_d(on)	Turn-on Delay Time	V_{DS} = 20 V, V_{GEN} = 10 V, R_G = 3.9 Ω, R_L = 1 Ω, I_{DS} = 20 A	-	6	-	nS
t_r	Turn-on Rise Time		-	41	-	
t_d(off)	Turn-off Delay Time		-	32	-	
t_f	Turn-off Fall Time		-	23	-	
Gate Charge Characteristics[b]						
Q_g	Total Gate Charge	V_{DS} =20 V, V_{GS} = 10 V, I_{DS} = 20 A	-	31	-	nC
Q_{gs}	Gate-Source Charge		-	7.6	-	
Q_{gd}	Gate-Drain Charge		-	5	-	

Notes :

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

b : Guaranteed by design, not subject to production testing



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

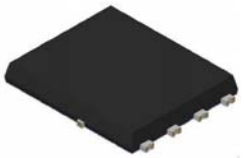
P-channel:

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_{DS} = - 250 μA	- 40	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_{DS} = - 250 μA	- 1.0	-	- 2.0	V
I_{DSS}	Drain Leakage Current	V_{DS} = - 32 V, V_{GS} = 0 V	-	-	- 1.0	μA
I_{GSS}	Gate Leakage Current	V_{GS} = 0 V, V_{GS} = ± 20 V	-	-	±100	nA
$R_{DS(ON)}$[a]	On-State Resistance	V_{GS} = - 10 V, I_{DS} = - 15 A	-	26	34	mΩ
		V_{GS} = - 4.5 V, I_{DS} = - 10 A	-	41	53	
Diode Characteristics						
V_{SD}[a]	Diode Forward Voltage	I_{SD} = - 15 A, V_{GS} = 0 V	-	-	- 1.3	V
t_{rr}	Reverse Recovery Time	I_{SD} = - 15 A, dI_{SD} / dt = 100 A / μs	-	12	-	nS
Q_{rr}	Reverse Recovery Charge		-	7.5	-	nC
Dynamic Characteristics[b]						
C_{iss}	Input Capacitance	V_{GS} = 0 V, V_{DS} = - 20 V Frequency = 1 MHz	-	1759	-	pF
C_{oss}	Output Capacitance		-	112	-	
C_{rss}	Reverse Transfer Capacitance		-	84	-	
t_d(on)	Turn-on Delay Time	V_{DS} = - 20 V, V_{GEN} = - 10 V, R_G = 3.9 Ω, R_L =1.33 Ω, I_{DS} = - 15 A	-	19	-	nS
t_r	Turn-on Rise Time		-	74	-	
t_d(off)	Turn-off Delay Time		-	201	-	
t_f	Turn-off Fall Time		-	94	-	
Gate Charge Characteristics[b]						
Q_g	Total Gate Charge	V_{DS} = - 20 V, V_{GS} = - 10 V, I_{DS} = -15 A	-	28	-	nC
Q_{gs}	Gate-Source Charge		-	9	-	
Q_{gd}	Gate-Drain Charge		-	3	-	

Notes：

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

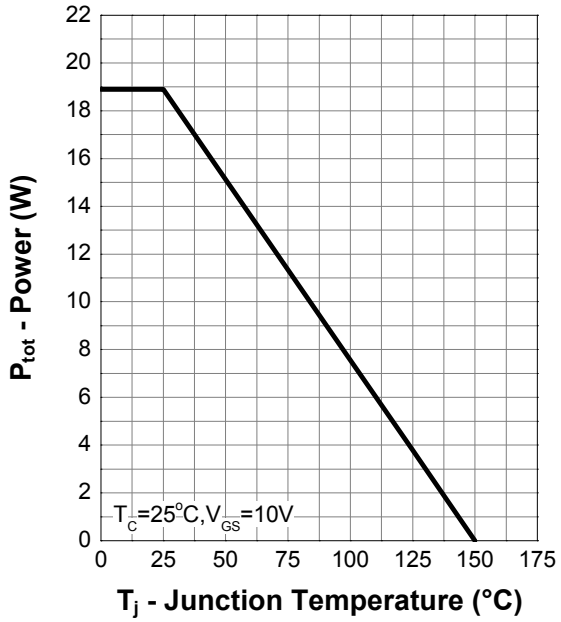
b : Guaranteed by design, not subject to production testing



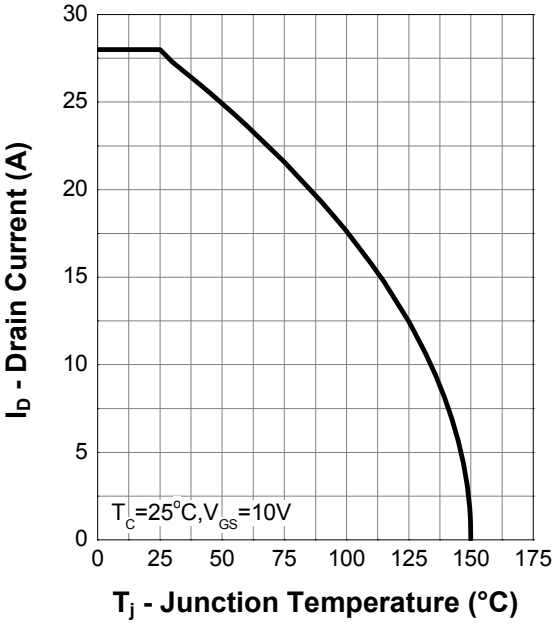
8. Typical Characteristics (Cont.)

N-channel:

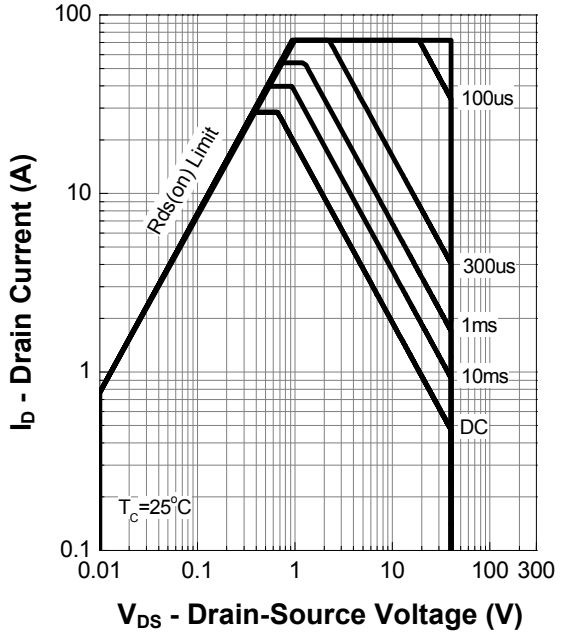
Power Capability



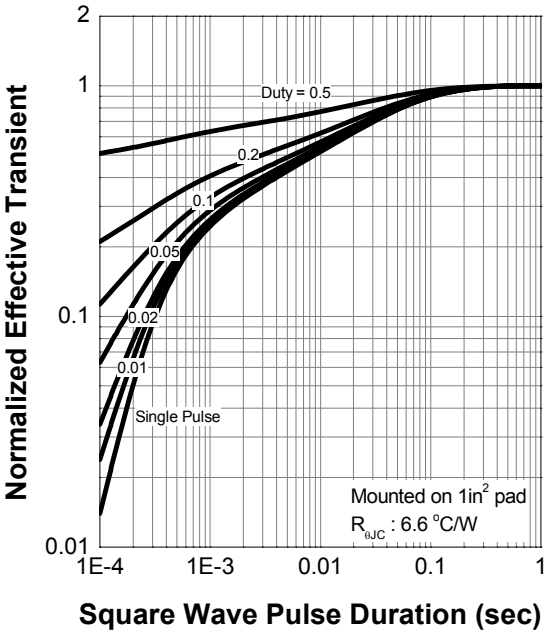
Current Capability

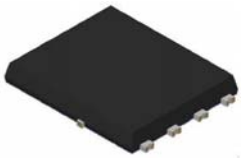


Safe Operation Area



Transient Thermal Impedance

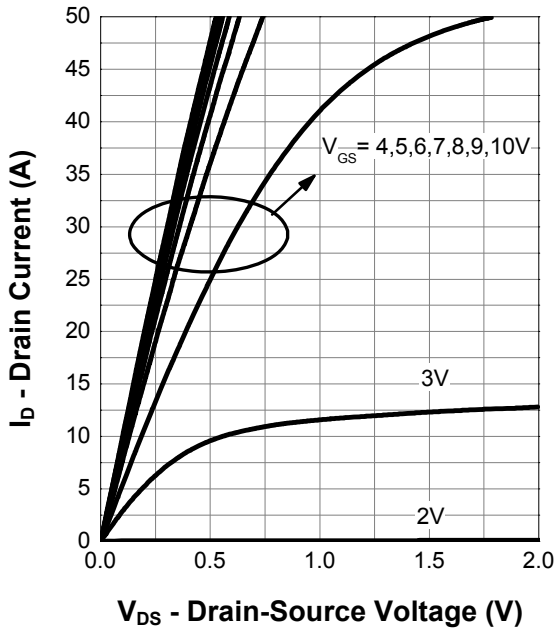




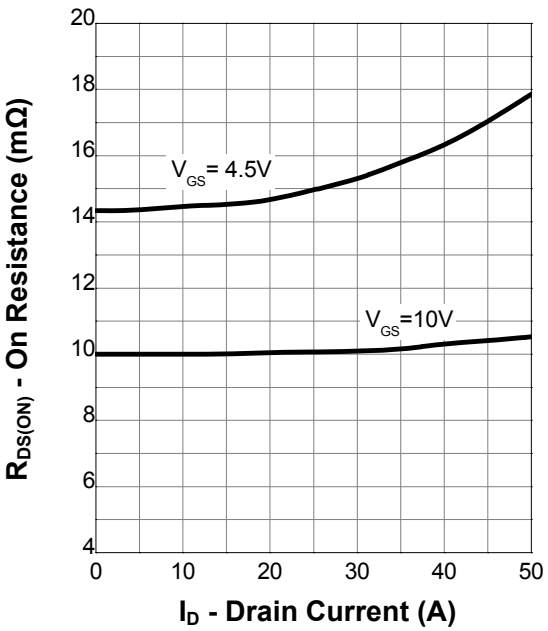
8. Typical Characteristics (Cont.)

N-channel:

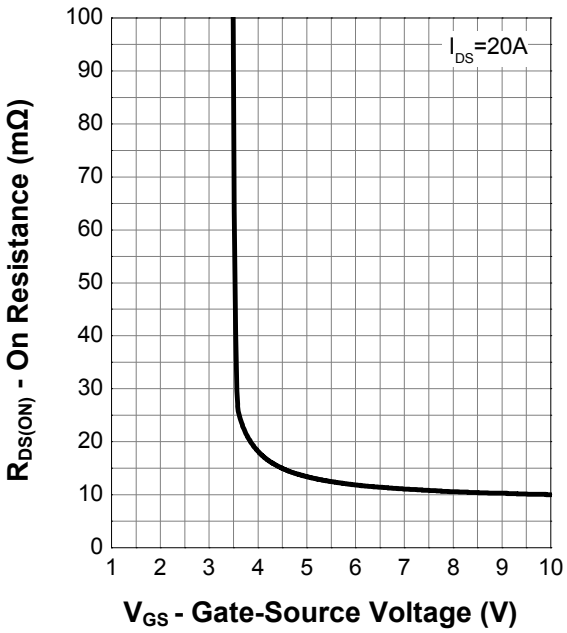
Output Characteristics



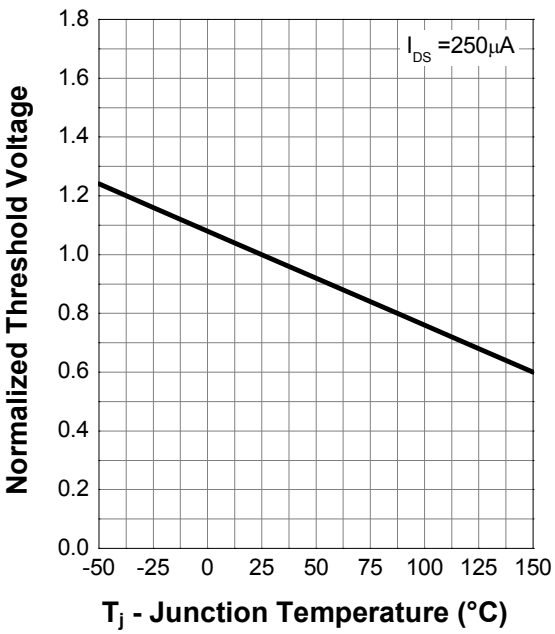
On Resistance

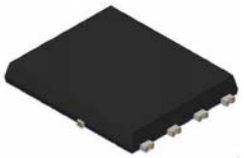


Transfer Characteristics



Normalized Threshold Voltage

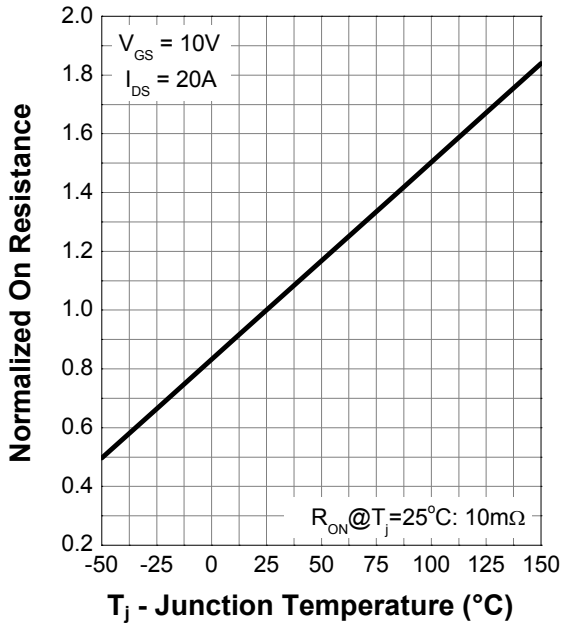




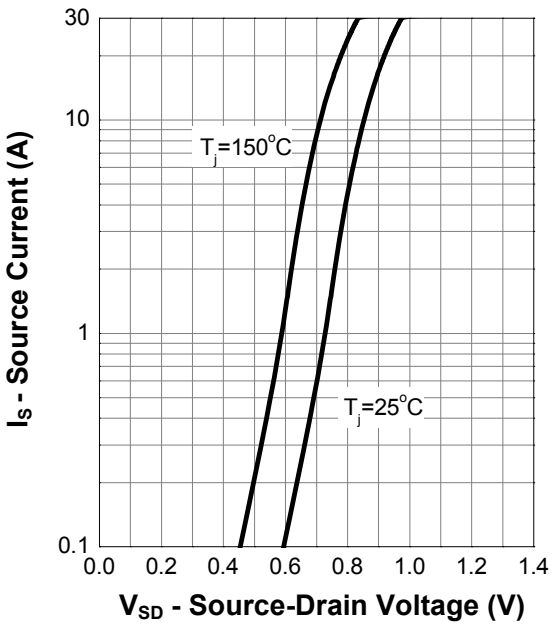
8. Typical Characteristics (Cont.)

N-channel:

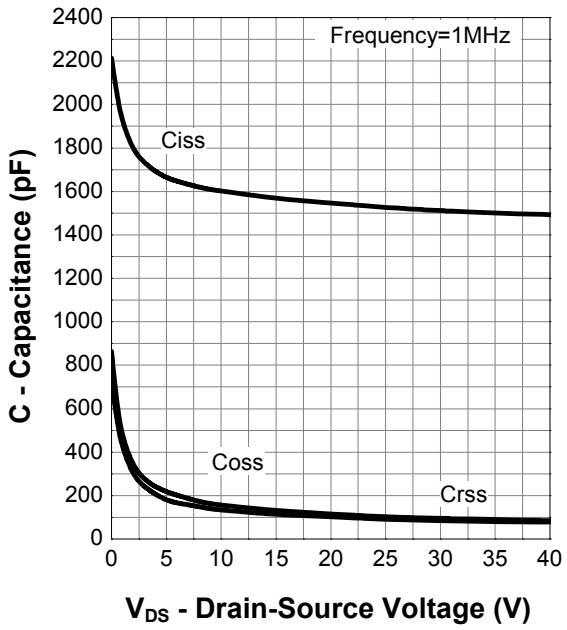
Normalized On Resistance



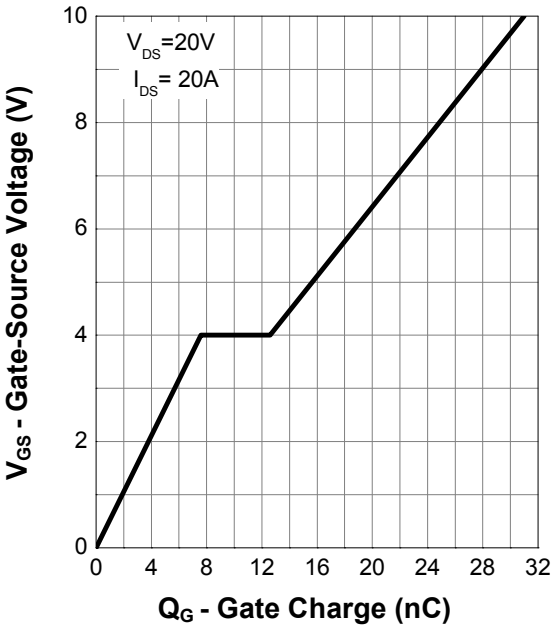
Diode Forward Current

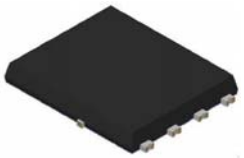


Capacitance



Gate Charge

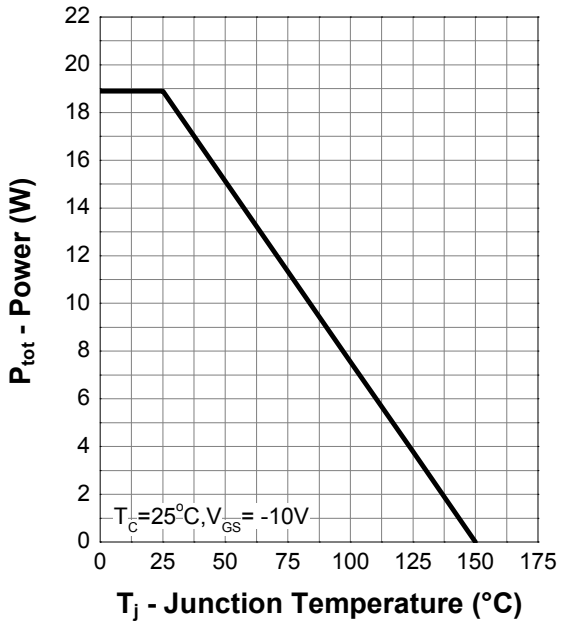




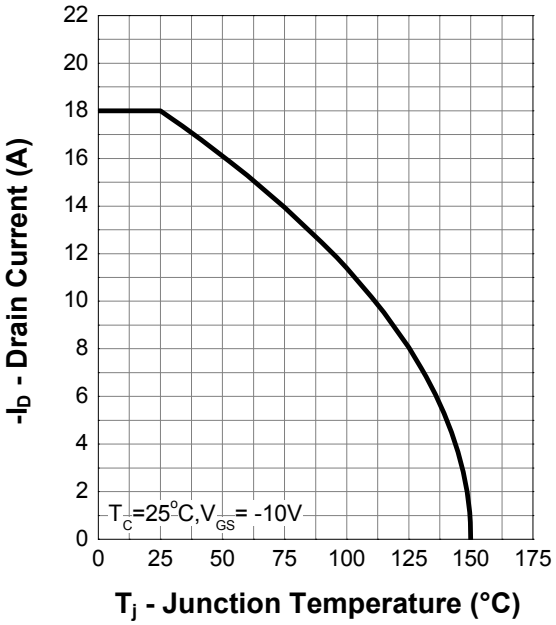
8. Typical Characteristics (Cont.)

P-channel:

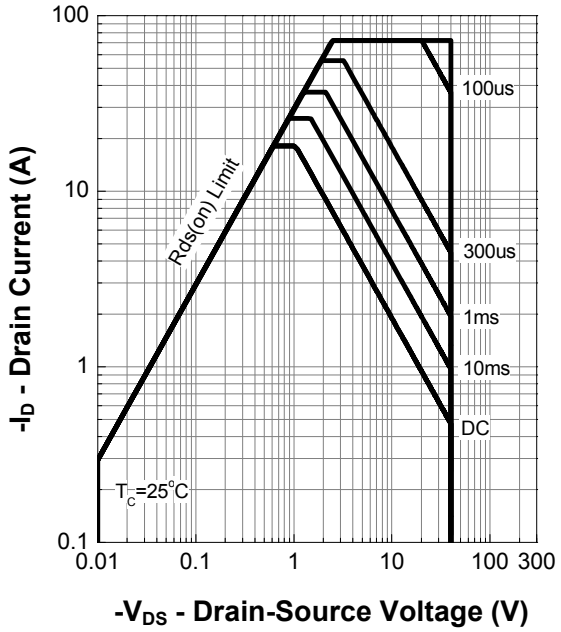
Power Capability



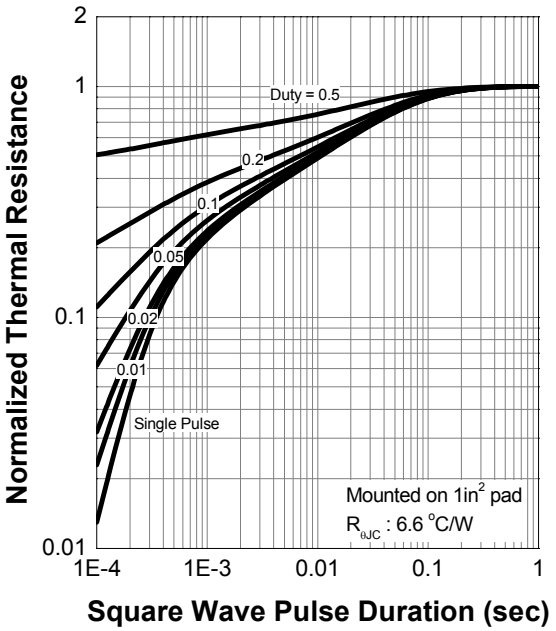
Current Capability

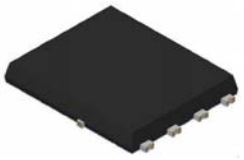


Safe Operation Area



Transient Thermal Impedance

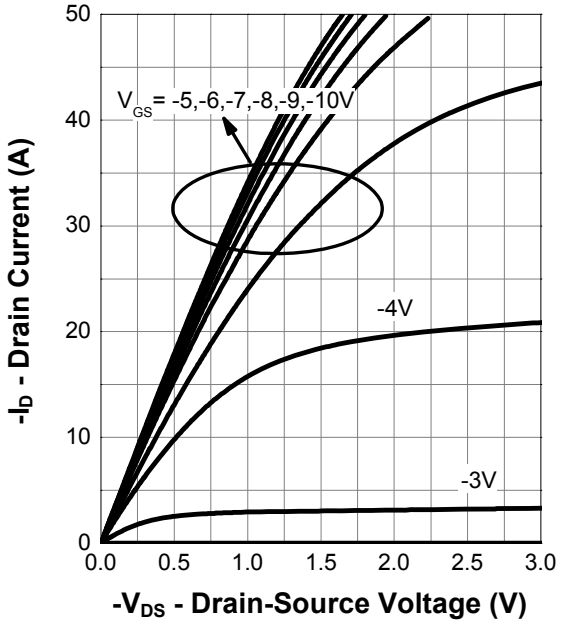




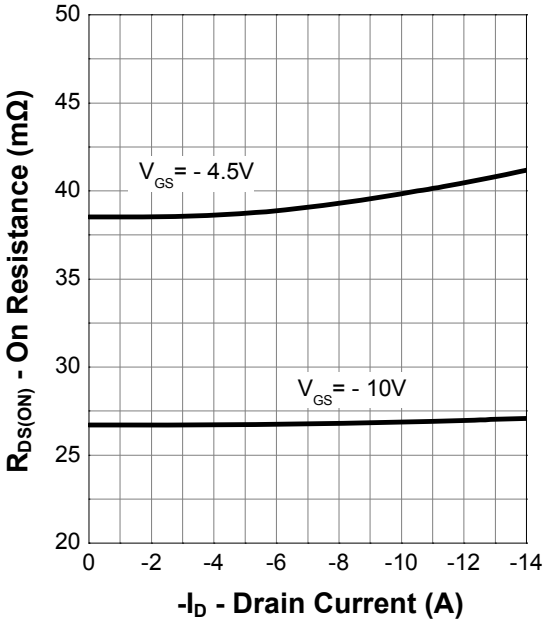
8. Typical Characteristics (Cont.)

P-channel:

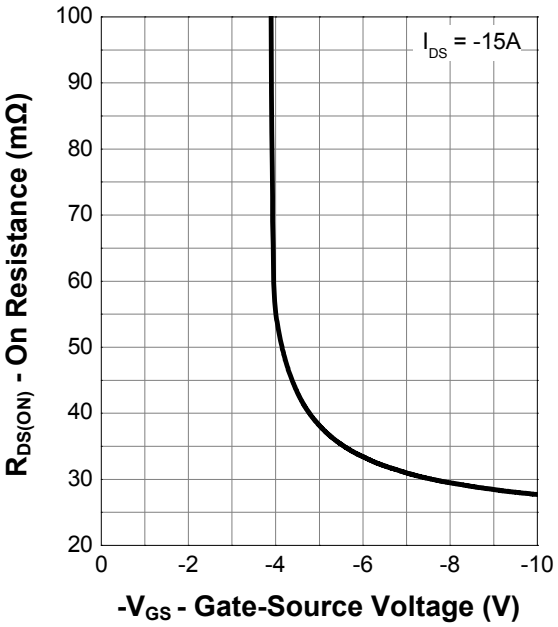
Output Characteristics



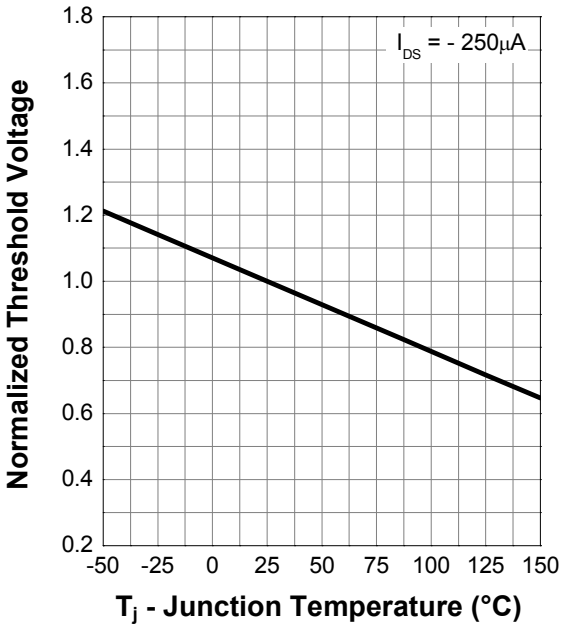
Drain-Source On Resistance

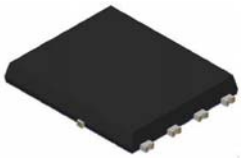


Transfer Characteristics



Normalized Threshold Voltage

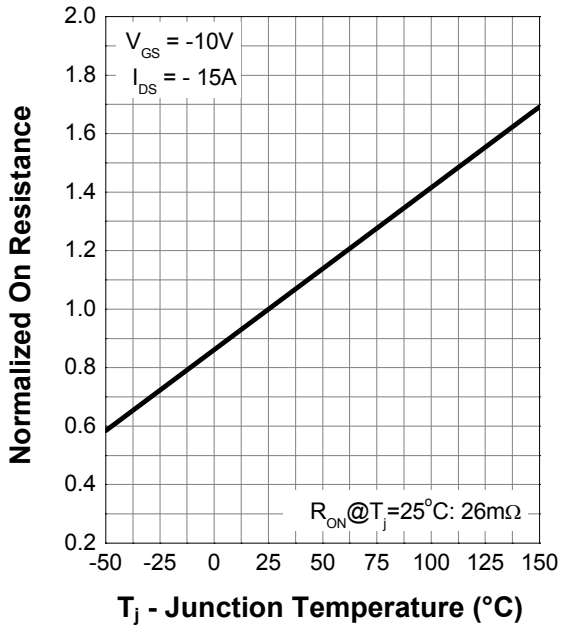




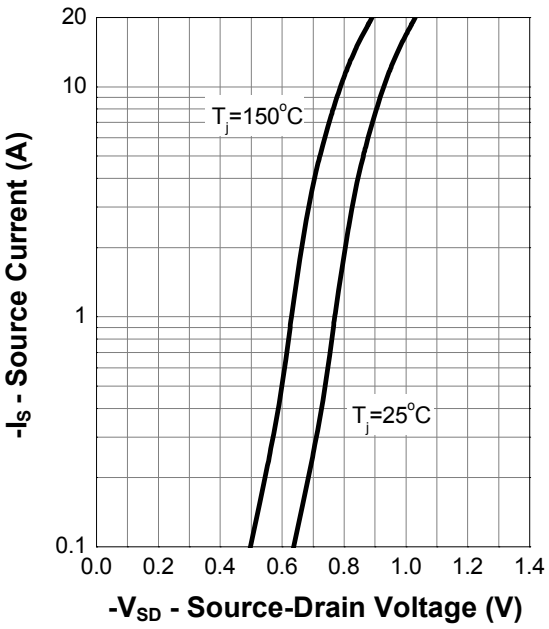
8. Typical Characteristics (Cont.)

P-channel:

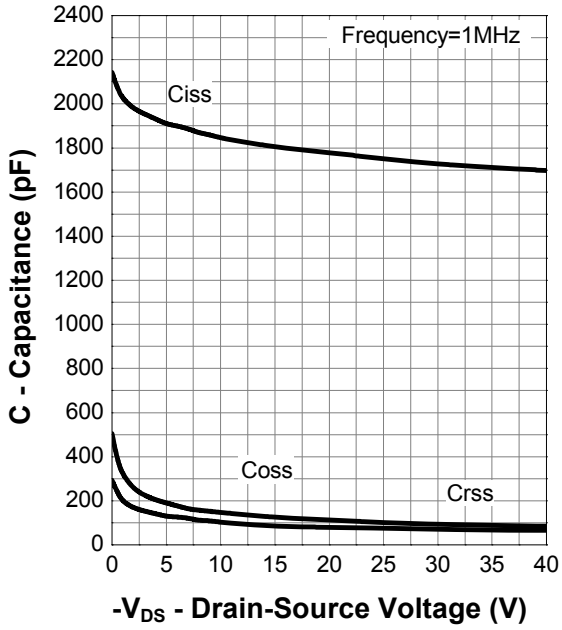
Normalized On Resistance



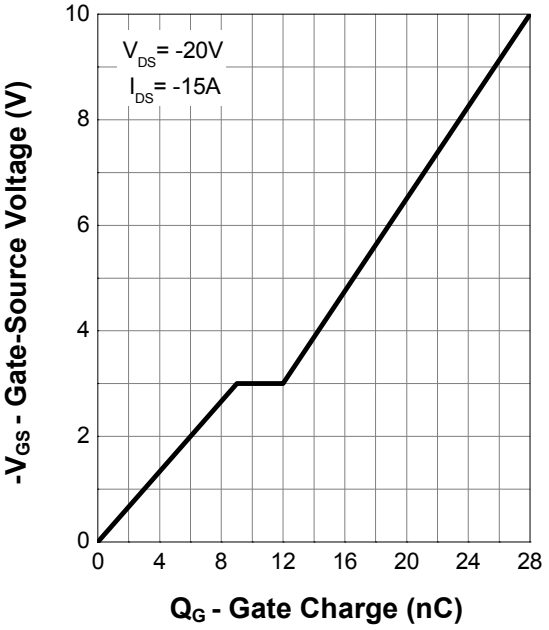
Diode Forward Current

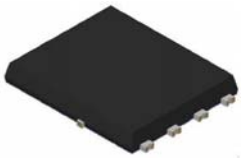


Capacitance



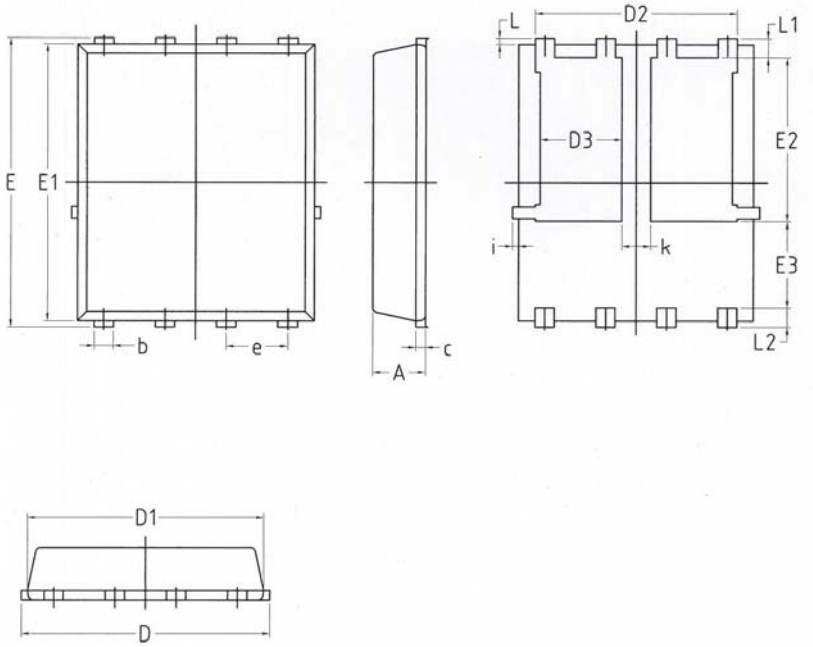
Gate Charge





9. 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