

Dual N-Channel 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

Channel-1

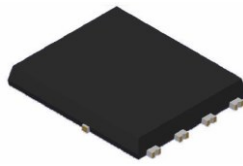
- ☒ $BV \geq 30\text{ V}$
- ☒ $P_{\text{tot}} \leq 44\text{ W}$
- ☒ $I_D \leq 72\text{ A}$
- ☒ $R_{\text{DS(ON)}} \leq 4.6\text{ m}\Omega @ V_{\text{GS}} = 10\text{ V}$
- ☒ $R_{\text{DS(ON)}} \leq 7.8\text{ m}\Omega @ V_{\text{GS}} = 4.5\text{ V}$

Channel-2

- ☒ $BV \geq 30\text{ V}$
- ☒ $P_{\text{tot}} \leq 78\text{ W}$
- ☒ $I_D \leq 96\text{ A}$
- ☒ $R_{\text{DS(ON)}} \leq 2.3\text{ m}\Omega @ V_{\text{GS}} = 10\text{ V}$
- ☒ $R_{\text{DS(ON)}} \leq 3.6\text{ m}\Omega @ V_{\text{GS}} = 4.5\text{ V}$

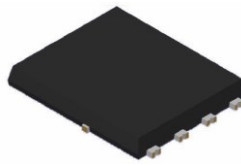
2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	G1		
2,3,4	D1		
8	G2		
5,6,7	S2		
		Bottom View PDFN5x6B-8L	



3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
Channel-1					
V_{DS}	Drain-Source Voltage	$T_C = 25\text{ }^{\circ}\text{C}$	-	30	V
V_{GS}	Gate-Source Voltage	$T_C = 25\text{ }^{\circ}\text{C}$	-	± 20	V
$I_{D^{*,**}}$	Drain Current (DC)	$T_A = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	16	A
		$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	72	A
		$T_C = 100\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	48	A
$I_{DM^{*,**}}$	Drain Current (Pulsed)	$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	220	A
E_{AS}^*	Single Pulsed Avalanche Energy	$V_{DD} = 30\text{ V}, L = 1.0\text{ mH}$	-	98	mJ
P_{tot}	Total Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	-	44	W
T_{stg}	Storage Temperature		- 55	150	$^{\circ}\text{C}$
T_J	Junction Temperature		-	150	$^{\circ}\text{C}$
I_S	Diode Forward Current	$T_C = 25\text{ }^{\circ}\text{C}$	-	72	A
$R_{\theta JA}^*$	Thermal Resistance- Junction to Ambient		-	60	$^{\circ}\text{C} / \text{W}$
$R_{\theta JC}^*$	Thermal Resistance- Junction to Case		-	2.8	$^{\circ}\text{C} / \text{W}$



Channel-2					
V_{DS}	Drain-Source Voltage	$T_C = 25\text{ }^{\circ}\text{C}$	-	30	V
V_{GS}	Gate-Source Voltage	$T_C = 25\text{ }^{\circ}\text{C}$	-	± 20	V
$I_D^{*,**}$	Drain Current (DC)	$T_A = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	25	A
		$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	96	A
		$T_C = 100\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	92	A
$I_{DM}^{*,**}$	Drain Current (Pulsed)	$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	480	A
E_{AS}^*	Single Pulsed Avalanche Energy	$V_{DD} = 30\text{ V}, L = 1.0\text{ mH}$	-	312	mJ
P_{tot}	Total Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	-	78	W
T_{stg}	Storage Temperature		- 55	150	$^{\circ}\text{C}$
T_J	Junction Temperature		-	150	$^{\circ}\text{C}$
I_S	Diode Forward Current	$T_C = 25\text{ }^{\circ}\text{C}$	-	96	A
$R_{\theta JA}^*$	Thermal Resistance- Junction to Ambient		-	55	$^{\circ}\text{C} / \text{W}$
$R_{\theta JC}^*$	Thermal Resistance- Junction to Case		-	1.6	$^{\circ}\text{C} / \text{W}$

Notes :

* Surface Mounted on 1 in² pad area, $t \leq 10\text{ sec}$

** Pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

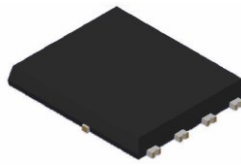
*** Limited by bonding wire

4. Marking Information

Product Name	Marking
iM1635	iM1635 XXXXX X : Date Code

5. Ordering Code

iM1635



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

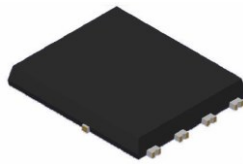
Channel-1:

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	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	-	3.7	4.6	mΩ
		V _{GS} = 4.5 V, I _D = 10 A	-	6	7.8	
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	-	17	-	nS
Q _{rr}	Reverse Recovery Charge		-	3.8	-	nC
Dynamic Characteristics ^b						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 15 V Frequency = 1 MHz	-	954	-	pF
C _{oss}	Output Capacitance		-	457	-	
C _{rss}	Reverse Transfer Capacitance		-	61	-	
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	-	6.4	-	nS
t _r	Turn-on Rise Time		-	89	-	
t _{d(off)}	Turn-off Delay Time		-	18	-	
t _f	Turn-off Fall Time		-	28	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{GS} = 10 V, V _{DS} = 15 V, I _{DS} = 20 A	-	18	-	nC
Q _{gs}	Gate-Source Charge		-	4.4	-	
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



6. Electrical Characteristics ($T_A = 25\text{ }^{\circ}\text{C}$ Unless Otherwise Noted)

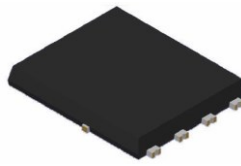
Channel-2:

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	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	-	1.9	2.3	mΩ
		V _{GS} = 4.5 V, I _D = 10 A	-	2.8	3.6	
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	-	29	-	nS
Q _{rr}	Reverse Recovery Charge		-	14	-	nC
Dynamic Characteristics ^b						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 15 V Frequency = 1 MHz	-	2292	-	pF
C _{oss}	Output Capacitance		-	1036	-	
C _{rss}	Reverse Transfer Capacitance		-	126	-	
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	-	8.3	-	nS
t _r	Turn-on Rise Time		-	65	-	
t _{d(off)}	Turn-off Delay Time		-	40	-	
t _f	Turn-off Fall Time		-	30	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{GS} = 10 V, V _{DS} = 15 V, I _{DS} = 20 A	-	42	-	nC
Q _{gs}	Gate-Source Charge		-	8.7	-	
Q _{gd}	Gate-Drain Charge		-	6.4	-	

Notes :

a : Pulse test ; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

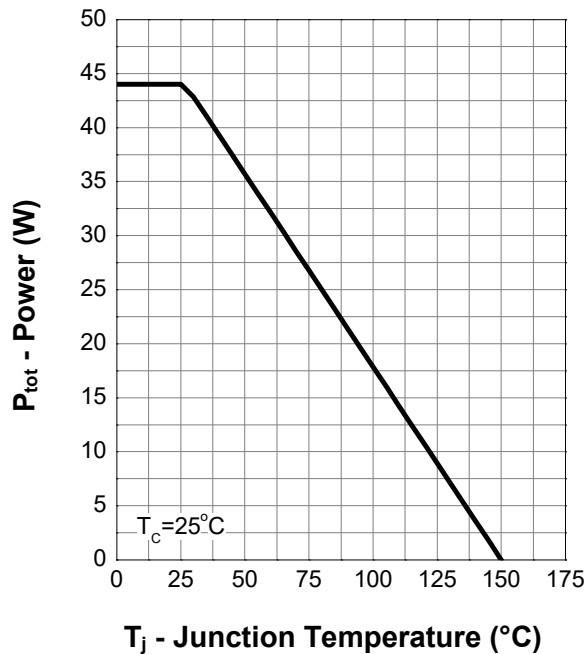
b : Guaranteed by design, not subject to production testing



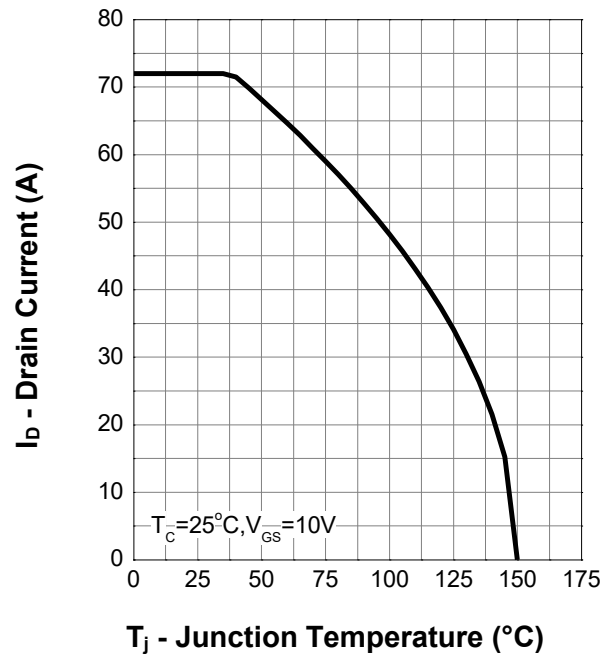
7. Typical Characteristics (Cont.)

Channel-1:

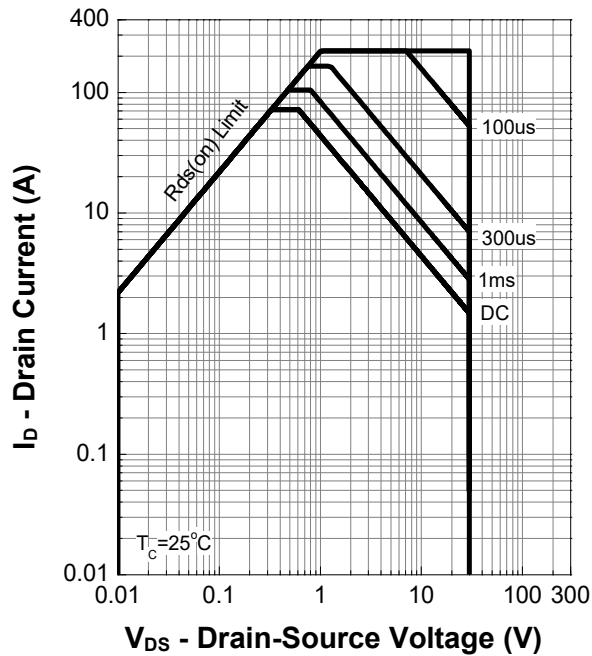
Power Capability



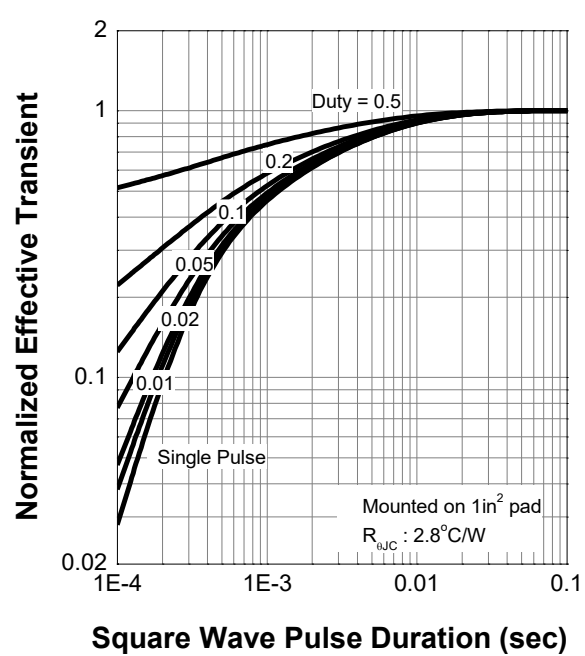
Current Capability

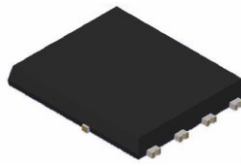


Safe Operation Area



Transient Thermal Impedance

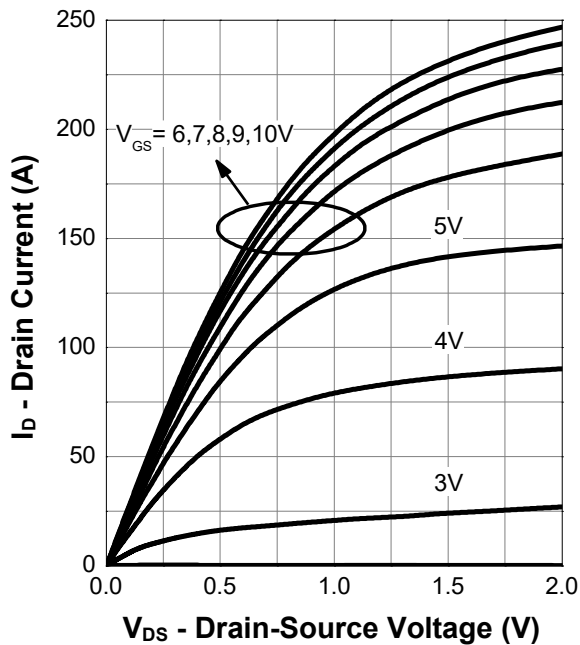




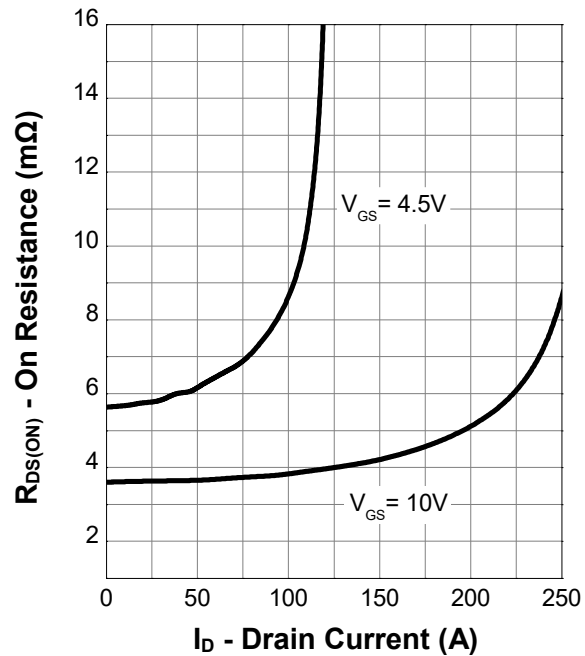
7. Typical Characteristics (Cont.)

Channel-1:

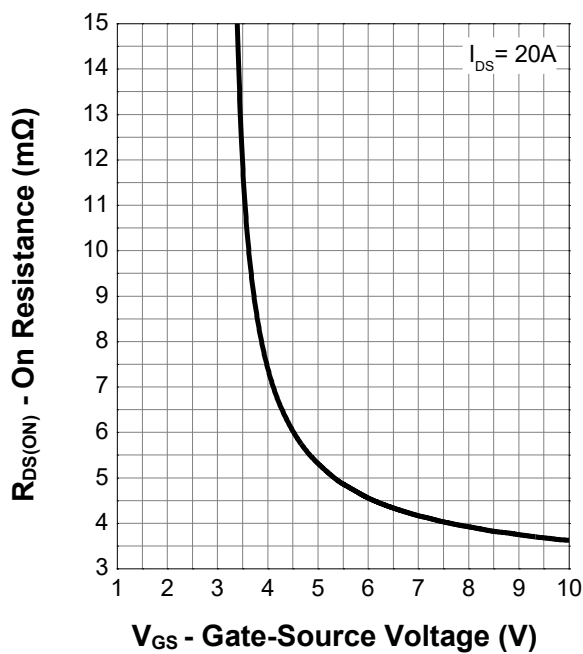
Output Characteristics



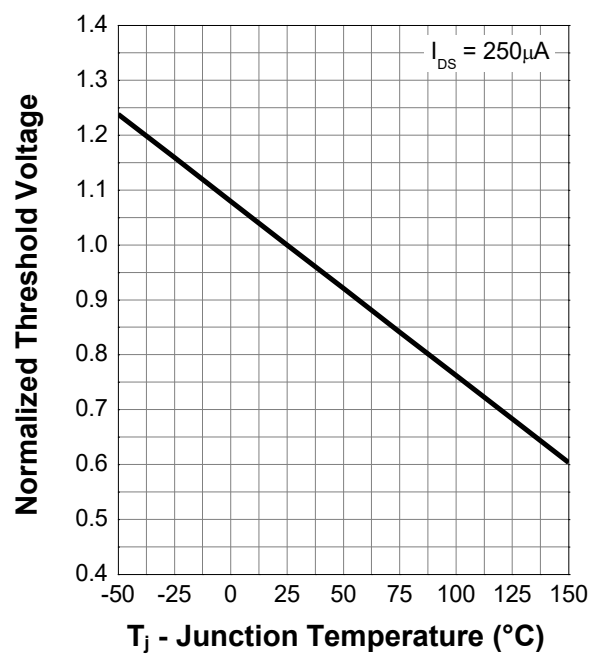
On Resistance

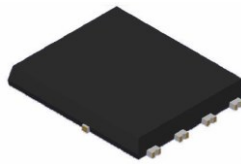


Transfer Characteristics



Normalized Threshold Voltage

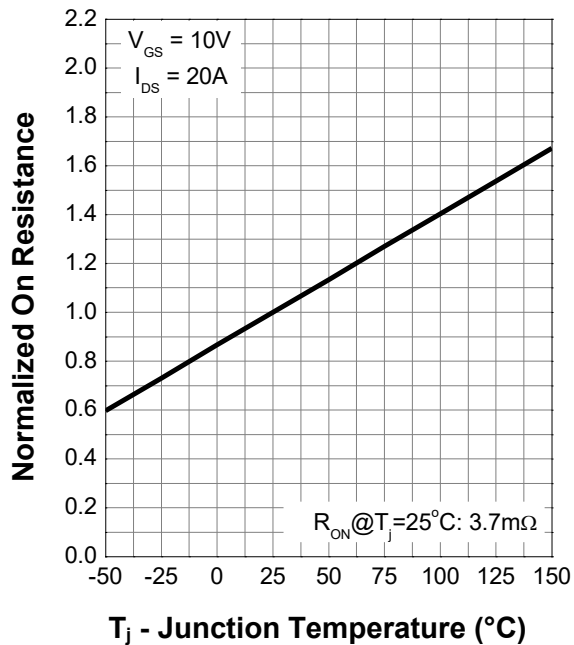




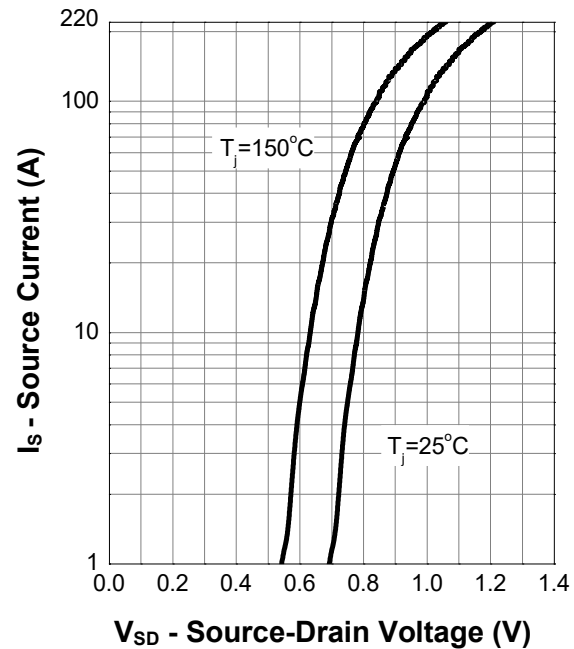
7. Typical Characteristics (Cont.)

Channel-1:

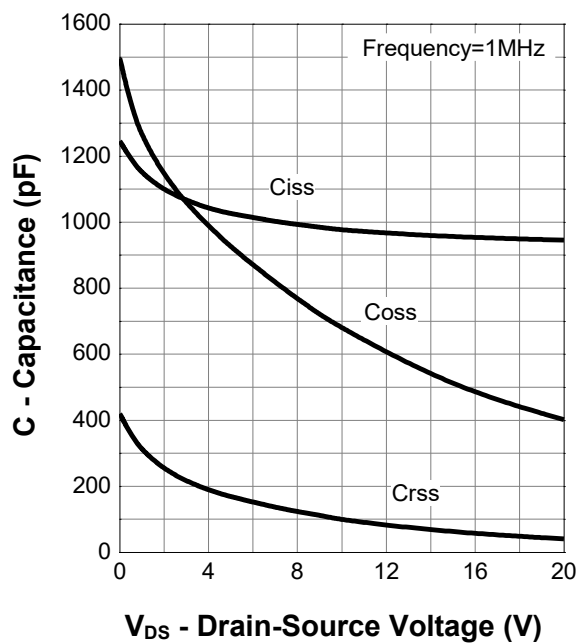
Normalized On Resistance



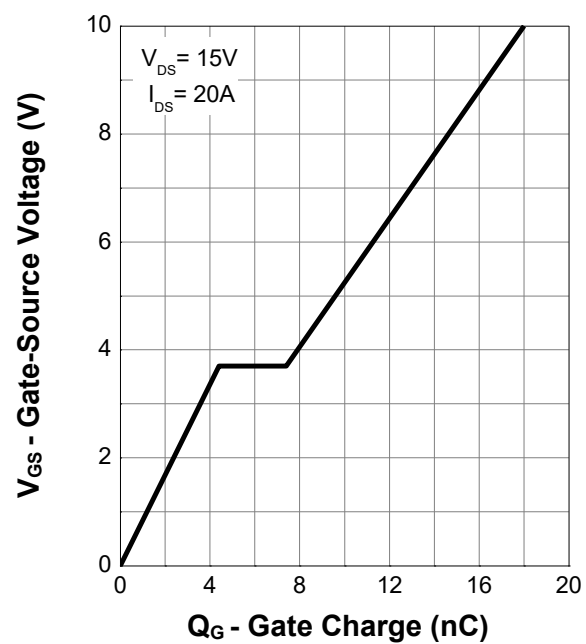
Diode Forward Current

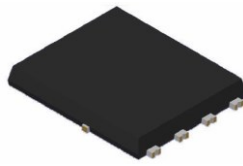


Capacitance



Gate Charge

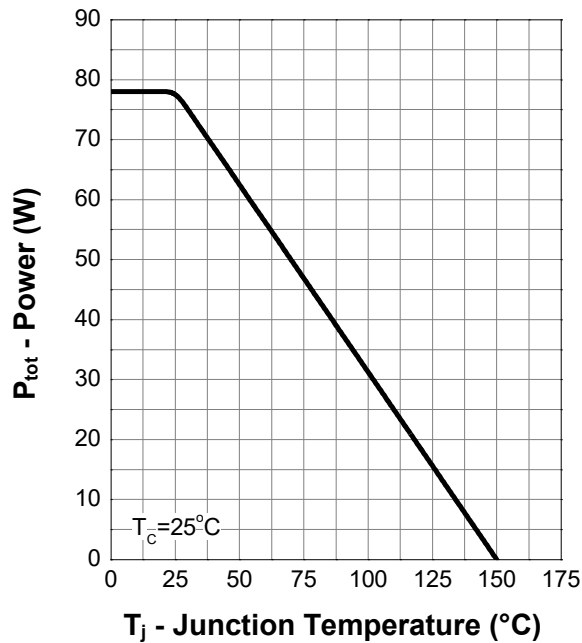




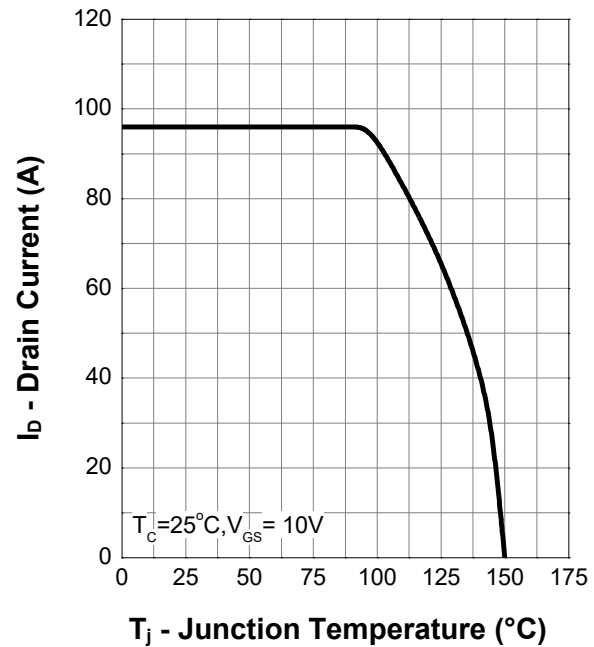
7. Typical Characteristics (Cont.)

Channel-2:

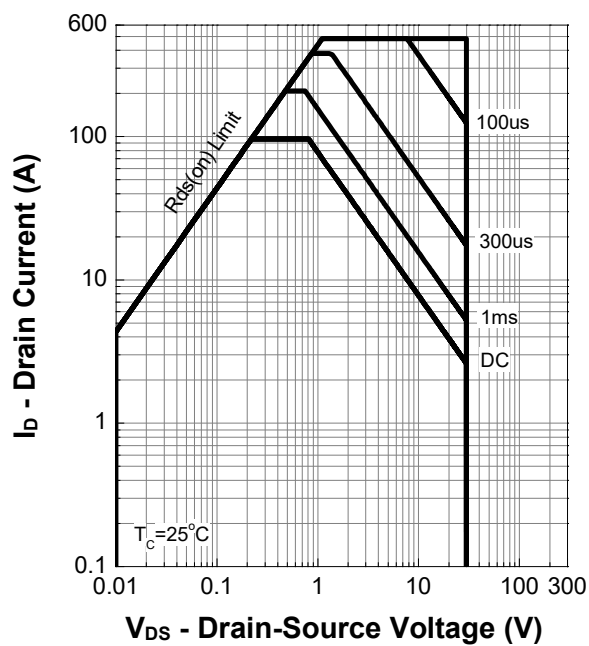
Power Capability



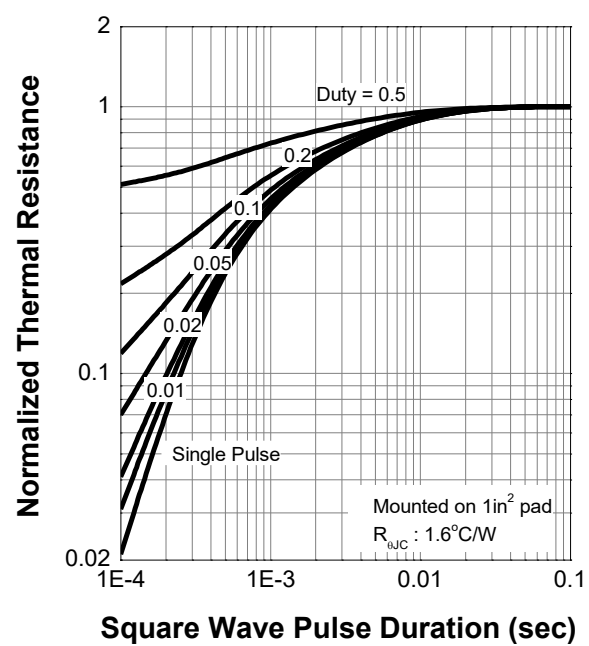
Current Capability

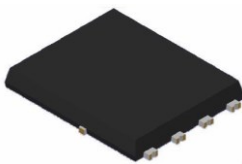


Safe Operation Area



Transient Thermal Impedance

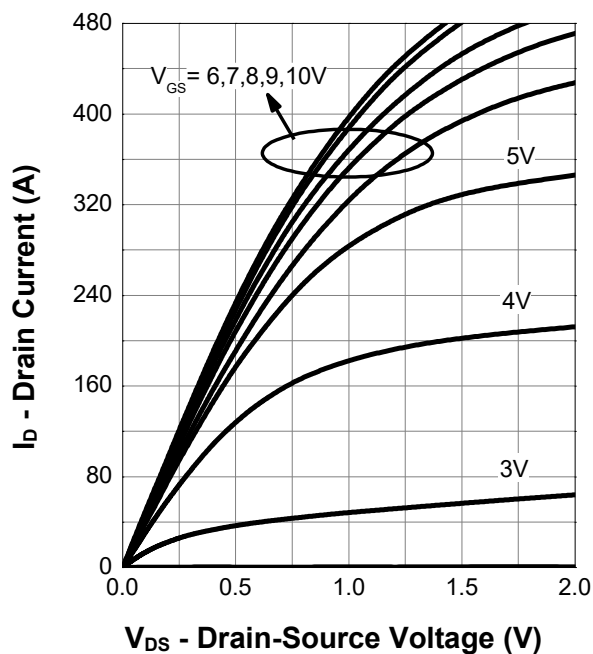




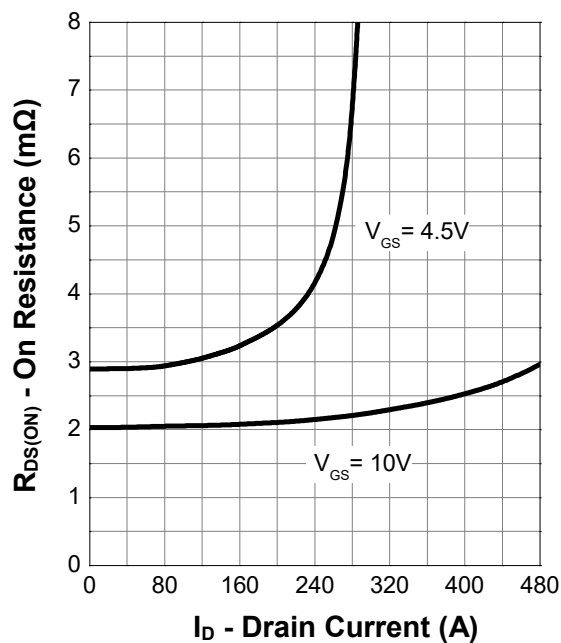
7. Typical Characteristics (Cont.)

Channel-2:

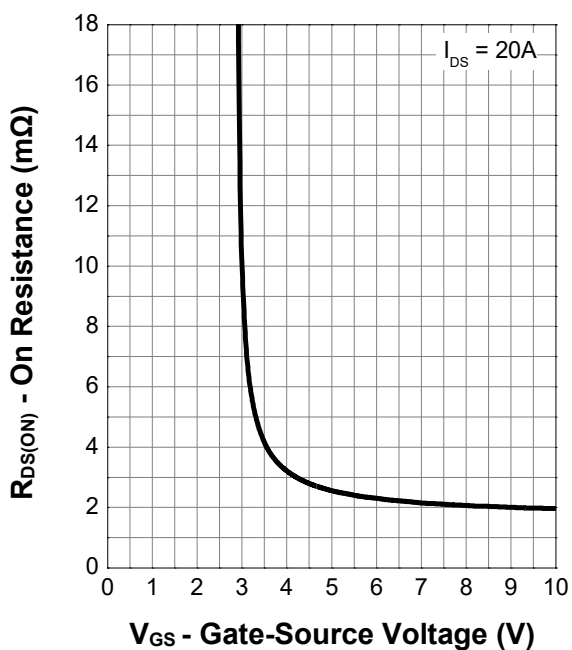
Output Characteristics



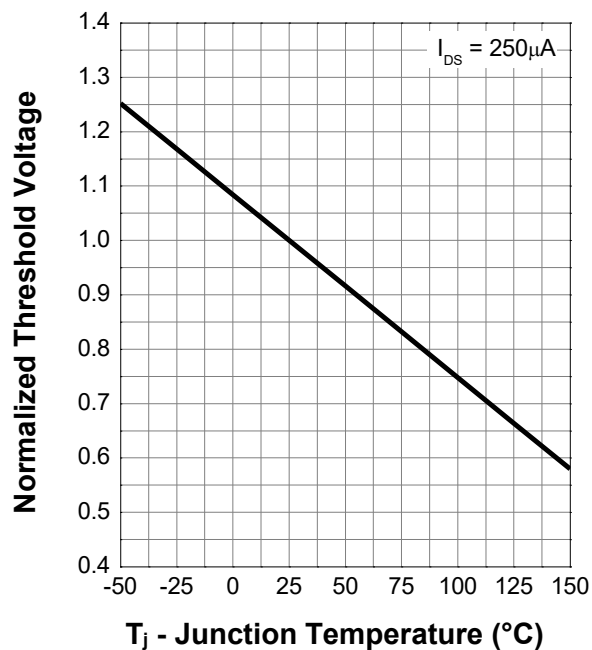
Drain-Source On Resistance

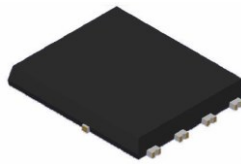


Transfer Characteristics



Normalized Threshold Voltage

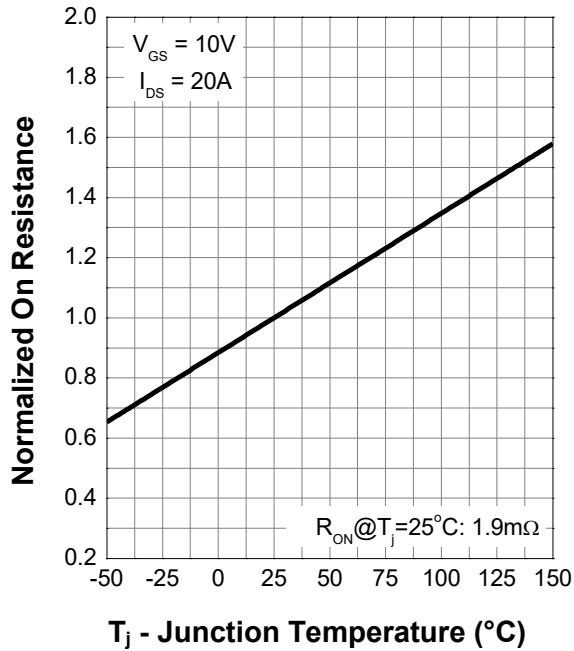




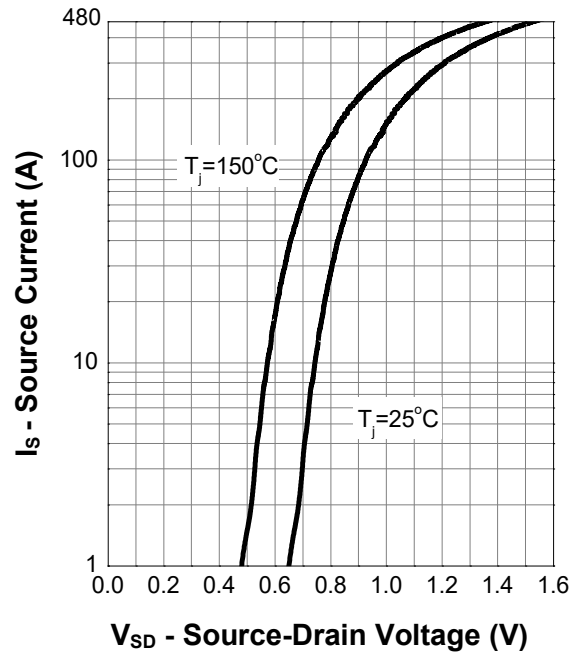
7. Typical Characteristics (Cont.)

Channel-2:

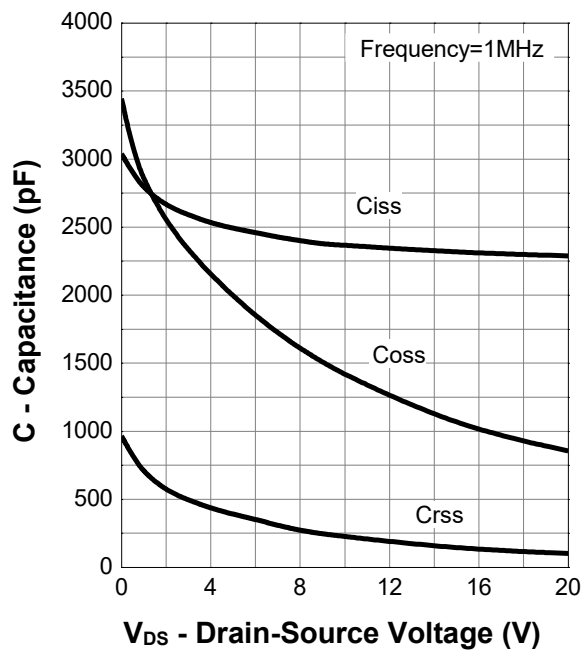
Normalized On Resistance



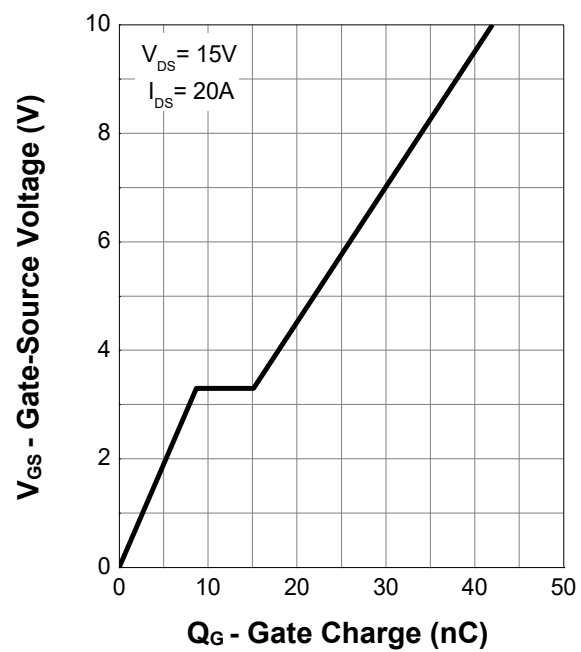
Diode Forward Current

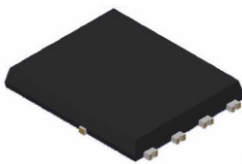


Capacitance



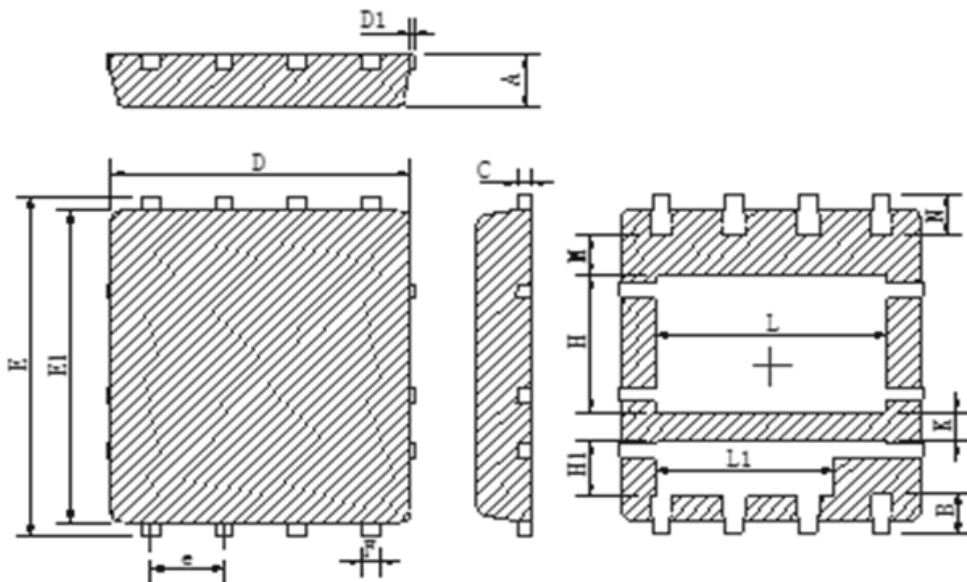
Gate Charge





8. Package Dimensions

PDFN 5x6B- 8L (Dual) Package



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	0.9	1.0
B	0.6	0.8
C	0.2	0.3
D	5.1	5.3
D1	-	0.12
E	5.95	6.15
E1	5.4	5.7
e	1.22	1.32
F	0.25	0.35
H	2.35	2.55
H1	0.88	1.08
L	3.8	4.2
L1	3.0	3.2
M	0.6	0.8
N	0.63	0.83
K	0.4	0.6