

N1-Ch and N2-Ch Fast Switching MOSFETs

Features

- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$

Applications

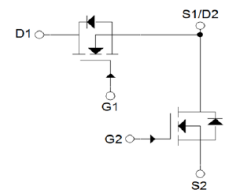
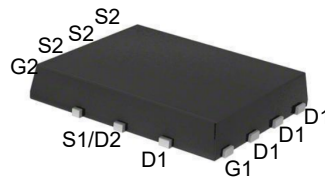
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

Product Summary



BVDSS	RDSON	ID
30V	5.5mΩ	30A
30V	4mΩ	40A

DFN3030-8L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N1-Channel	N2-Channe	
V_{DS}	Drain-Source Voltage	30	30	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	30	40	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	22	33	A
I_{DM}	Pulsed Drain Current ²	137	160	A
EAS	Single Pulse Avalanche Energy ³	33.8	20	mJ
I_{AS}	Avalanche Current	9	16	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ⁴	30.5	31.25	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	60	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	4	$^\circ\text{C/W}$

N1-Channel Electrical Characteristics (T_J=25 °C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	30	---	---	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =13A	---	5.5	7	mΩ
		V _{GS} =4.5V, I _D =10A	---	7.5	10	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.2	1.6	2	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =30V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =30V, V _{GS} =0V, T _J =100°C	---	---	100	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =10V, I _D =13A	---	60	---	S
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	1.5	---	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =15V, V _{GS} =10V, I _D =13A	---	10.3	---	nC
Q _{gs}	Gate-Source Charge		---	1.8	---	
Q _{gd}	Gate-Drain Charge		---	1.7	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =15V, V _{GS} =10V, R _G =3Ω I _D =13A	---	4.4	---	ns
T _r	Rise Time		---	3.6	---	
T _{d(off)}	Turn-Off Delay Time		---	12.2	---	
T _f	Fall Time		---	2.7	---	
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	625	---	pF
C _{oss}	Output Capacitance		---	240	---	
C _{rss}	Reverse Transfer Capacitance		---	25	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,6}	V _G =V _D =0V, Force Current	---	---	30	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =13A, T _J =25°C	---	---	1.2	V
t _{rr}	Reverse Recovery Time	I _F =13A, di/dt=100A/μs,	---	20	---	nS
Q _{rr}	Reverse Recovery Charge	T _J =25°C	---	4	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is VDD=25V,VGS=10V,L=0.4mH, IAS=9A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I_D and I_{DM}, in real applications , should be limited by total power dissipation.

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N2-Channel Electrical Characteristics (T_J=25°C unless otherwise specified)

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	30	-	-	V
Gate-body Leakage Current		I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T _J =25°C	I _{DSS}	V _{DS} = 30V, V _{GS} = 0V	-	-	1	μA
	T _J =100°C			-	-	100	
Gate-Threshold Voltage		V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1.2	1.6	2.4	V
Drain-Source On-Resistance ⁴		R _{DS(on)}	V _{GS} = 10V, I _D = 16A	-	4	5	mΩ
			V _{GS} = 4.5V, I _D =8A	-	6	8	
Forward Transconductance ⁴		g _{fs}	V _{DS} = 10V, I _D = 16A	-	130	-	S
Dynamic Characteristics ⁵							
Input Capacitance		C _{iss}	V _{DS} = 15V, V _{GS} =0V, f =1MHz	-	905	-	pF
Output Capacitance		C _{oss}		-	475	-	
Reverse Transfer Capacitance		C _{rss}		-	57	-	
Gate Resistance		R _g	f = 1MHz	-	1.9	-	Ω
Switching Characteristics ⁵							
Total Gate Charge		Q _g	V _{GS} = 10V, V _{DS} = 15V, I _D = 16A	-	16	-	nC
Gate-Source Charge		Q _{gs}		-	3	-	
Gate-Drain Charge		Q _{gd}		-	3.3	-	
Turn-On Delay Time		t _{d(on)}	V _{GS} =10V, V _{DD} = 15V, R _G = 3Ω, I _D = 16A	-	6.3	-	ns
Rise Time		t _r		-	3.2	-	
Turn-Off Delay Time		t _{d(off)}		-	18	-	
Fall Time		t _f		-	3.6	-	
Body Diode Reverse Recovery Time		t _{rr}	I _F 16A, dI/dt=100A/μs	-	10	-	ns
Body Diode Reverse Recovery Charge		Q _{rr}		-	13.2	-	nC
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ⁴		V _{SD}	I _S = 16A, V _{GS} = 0V	-	-	1.2	V
Continuous Source Current	T _C =25°C	I _S	-	-	-	40	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)} = 150°C.
2. The EAS data shows Max. rating. The test condition is V_{DD} = 25V, V_{GS} = 10V, L = 0.1mH, I_{AS} = 16A.
3. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

N1-Typical Characteristics

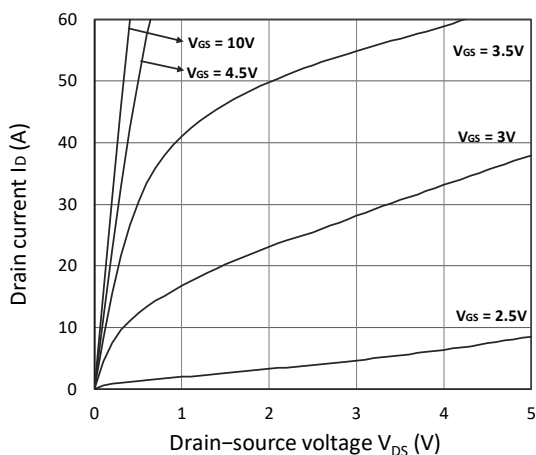


Figure 1. Output Characteristics

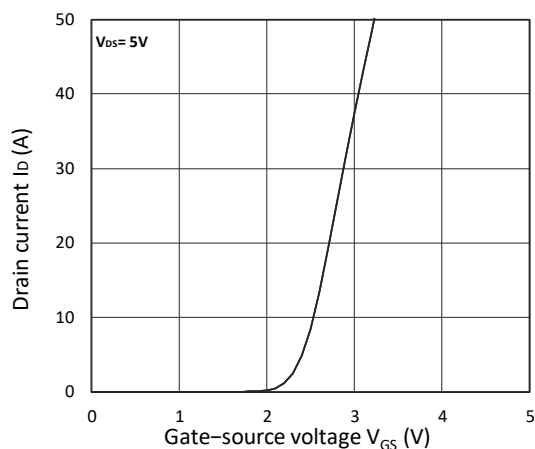


Figure 2. Transfer Characteristics

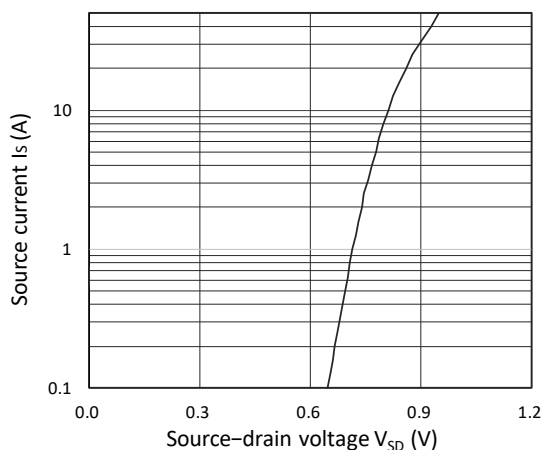


Figure 3. Forward Characteristics of Reverse

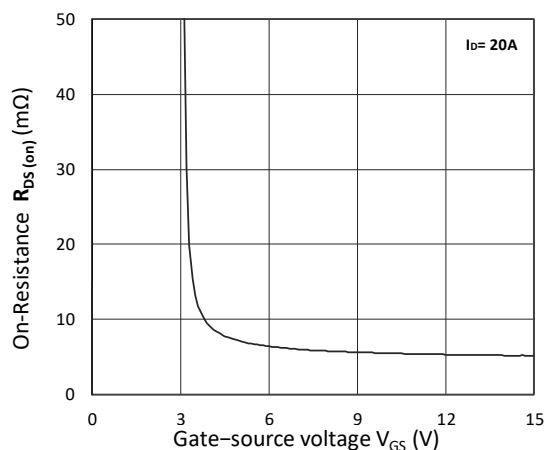


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

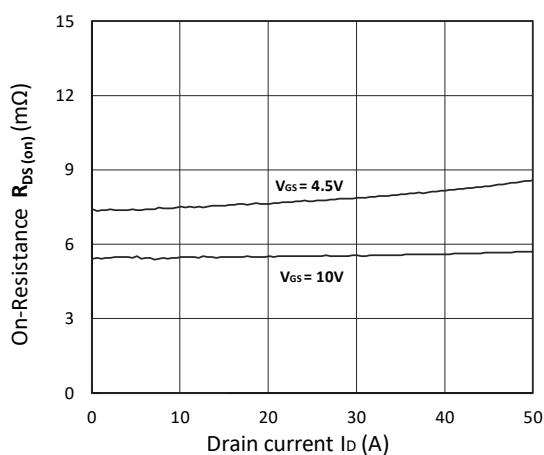


Figure 5. $R_{DS(ON)}$ vs. I_D

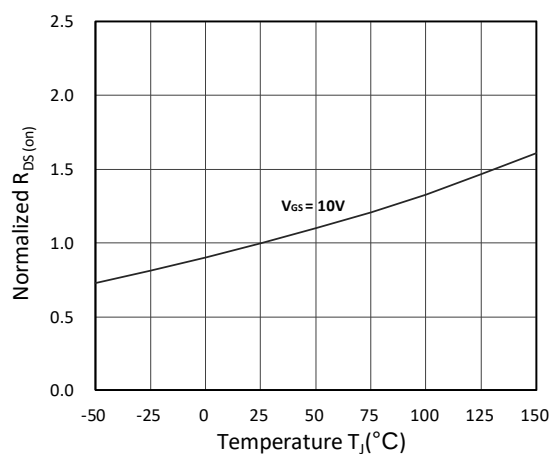


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

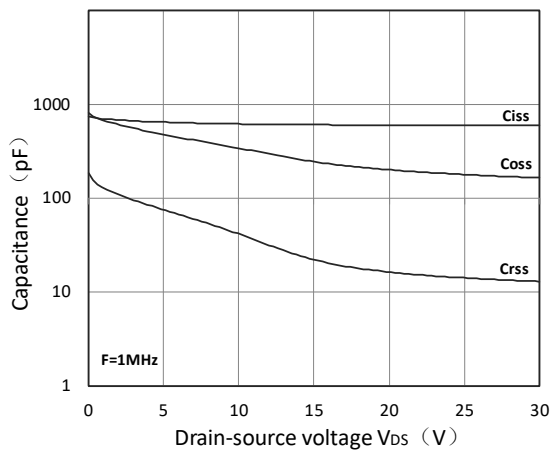


Figure 7. Capacitance Characteristics

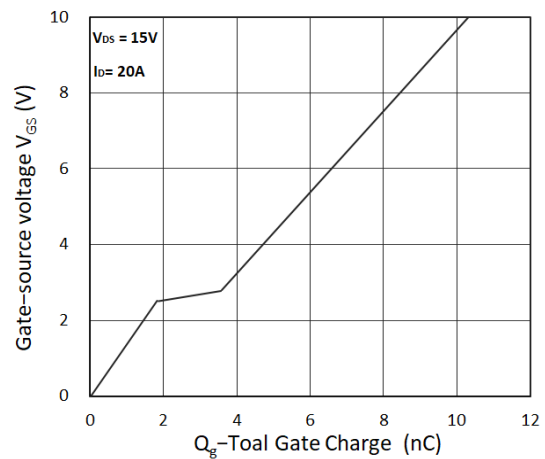


Figure 8. Gate Charge Characteristics

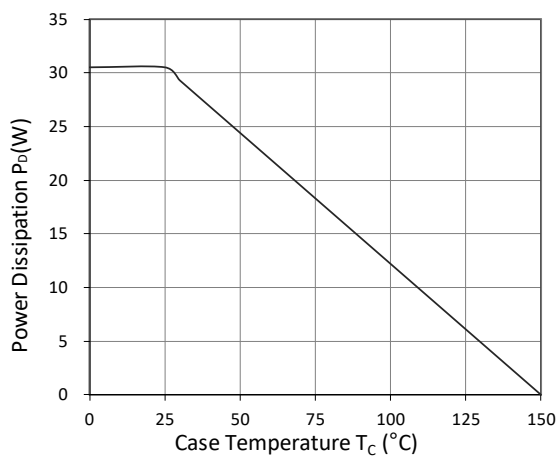


Figure 9. Power Dissipation

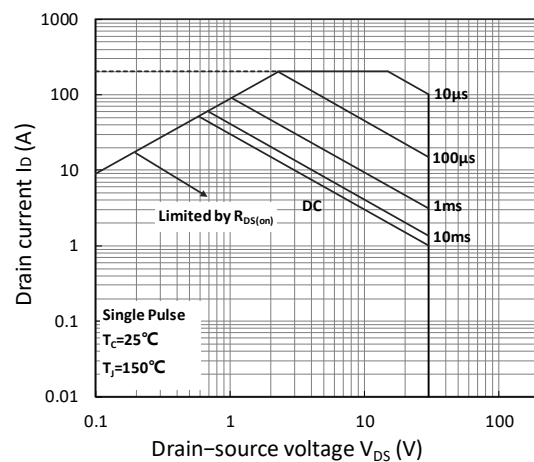


Figure10. Safe Operating Area

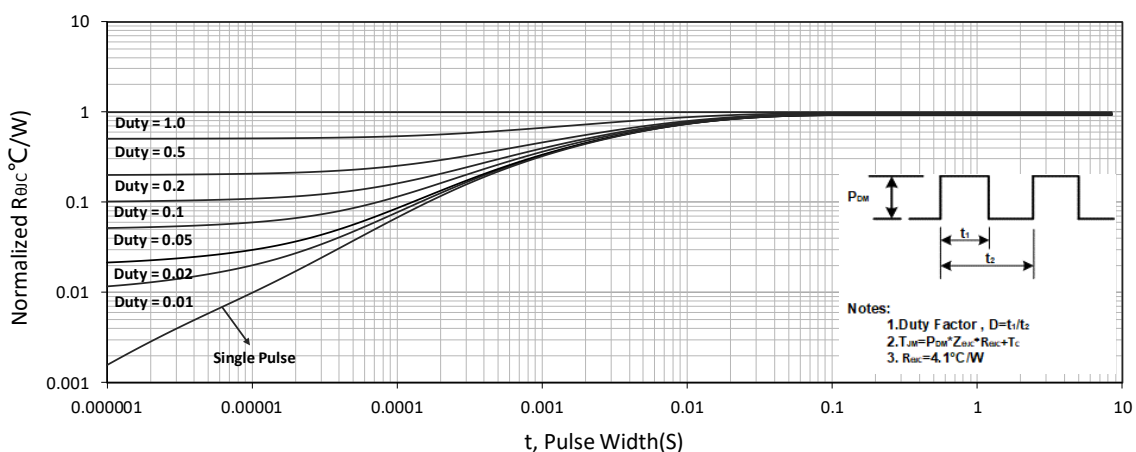


Figure 11. Normalized Maximum Transient Thermal Impedance

N2-Typical Characteristics

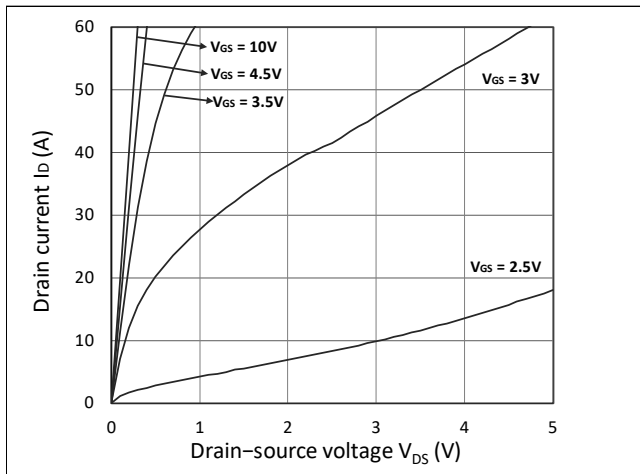


Figure 1. Output Characteristics

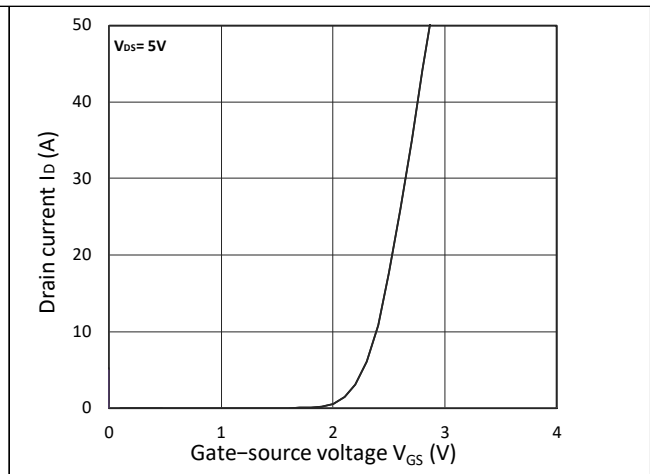


Figure 2. Transfer Characteristics

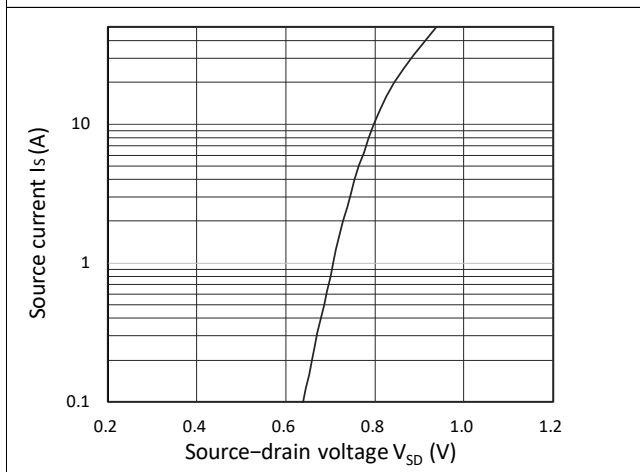


Figure 3. Forward Characteristics of Reverse

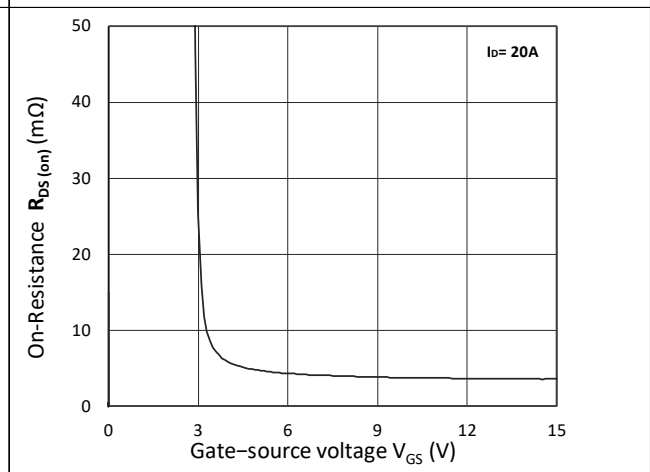


Figure 4. $R_{DS(on)}$ vs. V_{GS}

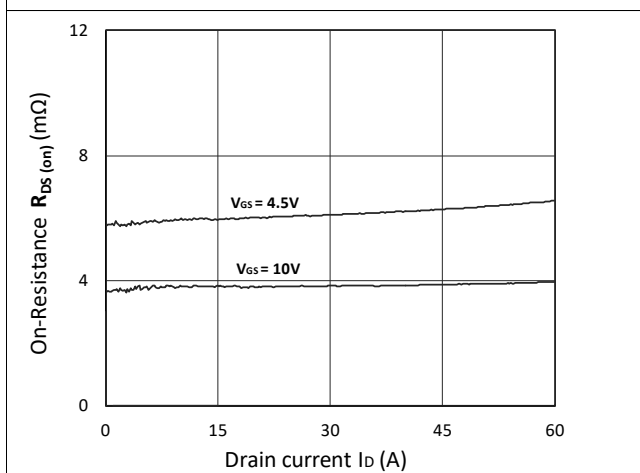


Figure 5. $R_{DS(on)}$ vs. I_D

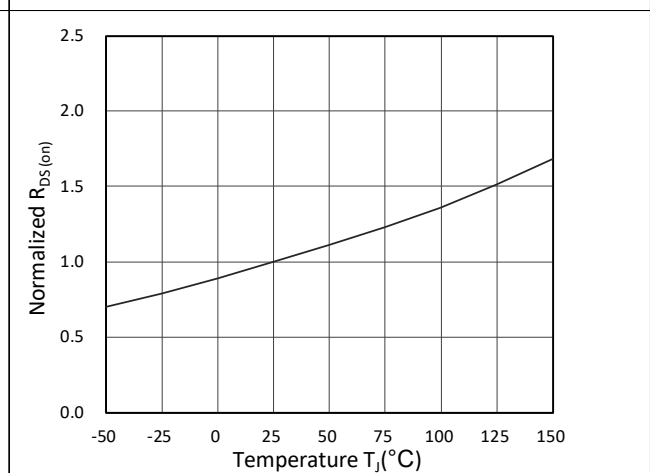


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

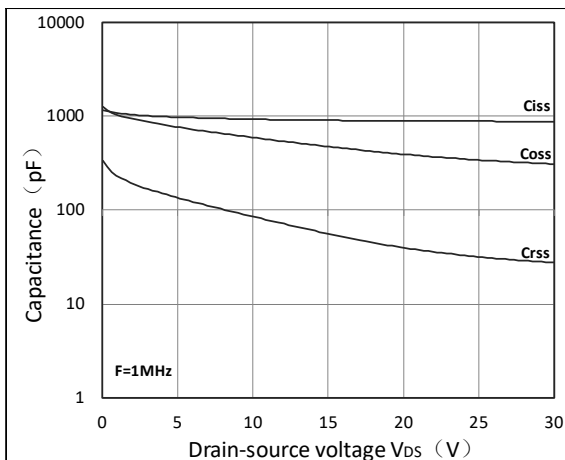


Figure 7. Capacitance Characteristics

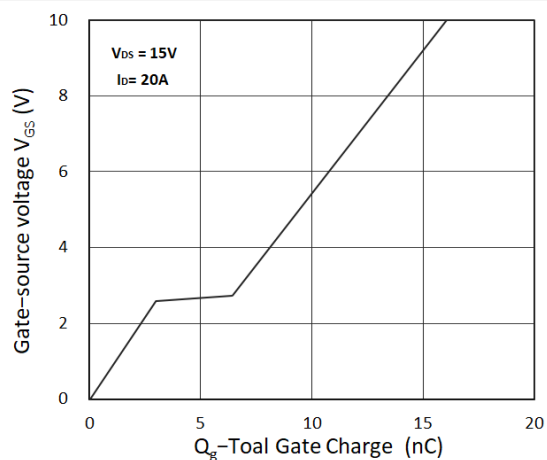


Figure 8. Gate Charge Characteristics

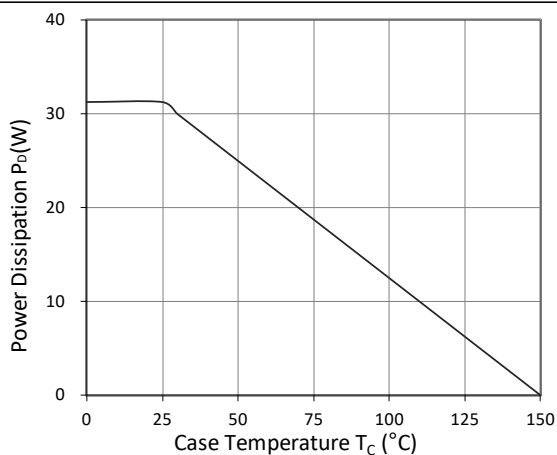


Figure 9. Power Dissipation

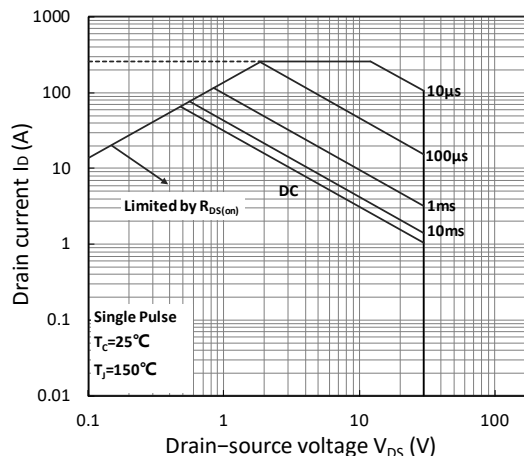


Figure 10. Safe Operating Area

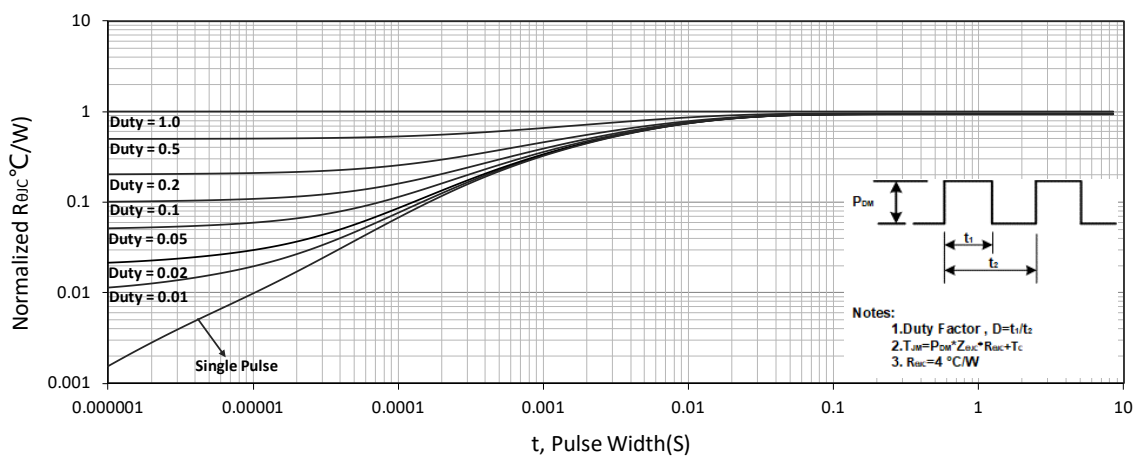
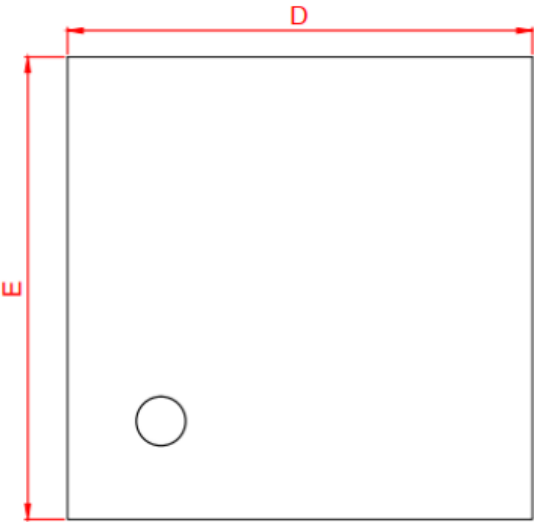
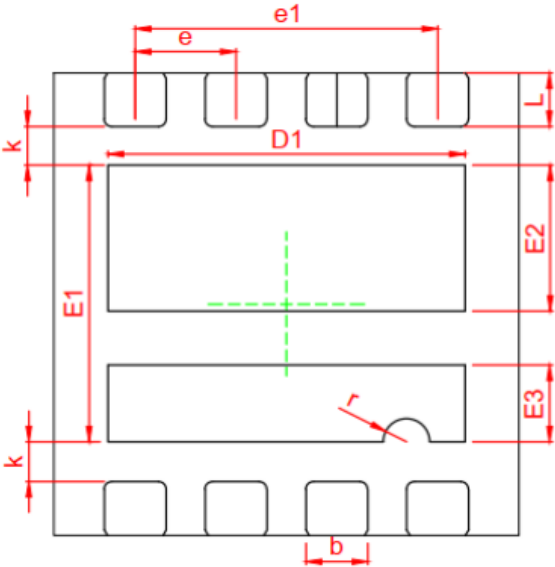


Figure 11. Normalized Maximum Transient Thermal Impedance

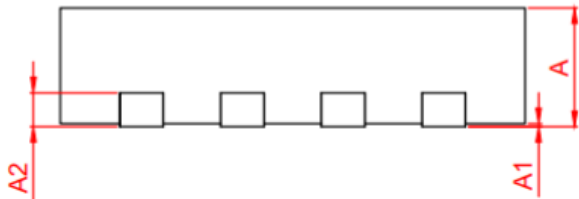
Package Mechanical Data-DFN3030-8L-Single



TOP VIEW



BOTTOM VIEW



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
* A1	0.00	0.02	0.05
* b	0.35	0.40	0.40
* A2	0.203 BSC		
* D	2.95	3.00	3.05
* E	2.95	3.00	3.05
* D1	2.25	2.30	2.35
* E1	1.70	1.80	1.90
* E2	0.90	0.95	1.00
* E3	0.45	0.50	0.55
* e	0.65 BSC		
* e1	1.95 BSC		
* k	0.20	0.25	0.30
* L	0.30	0.35	0.40
r	0.15 REF		