




# Power MOSFETS


## DATASHEET

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**LM20380DLA6A**

Dual N-Channel  
Enhancement Mode MOSFET

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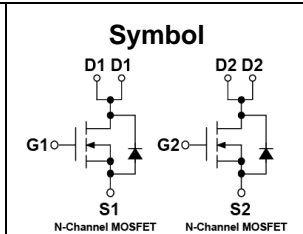
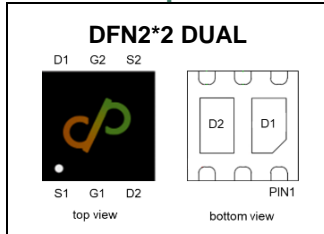


Quality Management Systems

ISO 9001:2015 Certificate

## Dual N-Channel Enhancement Mode MOSFET

### Pin Description



### Product Summary

Symbol	Dual N-Channel	Unit
$V_{DSS}$	20	V
$R_{DS(ON)-Max}$	30	mΩ
ID	4.4	A

### Feature

- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- Fast switching speed
- Surface mount package

### Applications

- Small BLCD motor drive
- Portable equipment application
- Power management in battery-driven

### Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM20380DLA6A	DFN2*2(Dual)	Tape & Reel	4000 / Tape & Reel	1□□□

Note: □□□ = Lot code

### Absolute Maximum Ratings ( $T_J=25^{\circ}C$ Unless Otherwise Noted)

Symbol	Parameter	Dual N-Channel	Unit	
$V_{DSS}$	Drain-Source Voltage	20	V	
$V_{GSS}$	Gate-Source Voltage	±12		
$T_J$	Maximum Junction Temperature	150	°C	
$T_{STG}$	Storage Temperature Range	-55 to 150	°C	
$I_S$	Diode Continuous Forward Current	$T_A=25^{\circ}C$	0.7	A
$I_{DM}^{①}$	Pulse Drain Current Tested	$T_A=25^{\circ}C$	10	A
$I_D^{②}$	Continuous Drain Current	$T_A=25^{\circ}C$	4.4	A
		$T_A=70^{\circ}C$	3.3	
$P_D^{②}$	Maximum Power Dissipation	$T_A=25^{\circ}C$	0.9	W
		$T_A=70^{\circ}C$	0.6	
$I_{AS}^{③}$	Avalanche Current, Single pulse	L=0.1mH	9.3	A
		L=0.5mH	5.3	
$E_{AS}^{③}$	Avalanche Energy, Single pulse	L=0.1mH	4.3	mJ
		L=0.5mH	7.1	

### Thermal Characteristics

Symbol	Parameter	Rating	Unit	
$R_{\theta JA}^{②}$	Thermal Resistance-Junction to Ambient	Steady State	140	°C/W

Note ① : Max. current is limited by junction temperature.

Note ② : Surface Mounted on 1in<sup>2</sup> FR-4 board with 1oz.

Note ③ : UIS tested and pulse width are limited by maximum junction temperature 150°C.

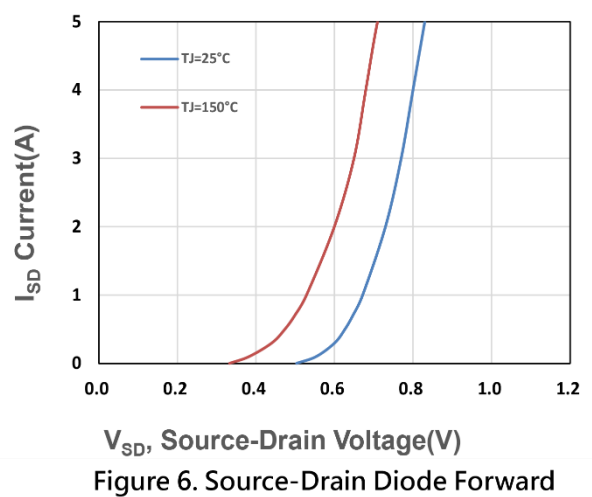
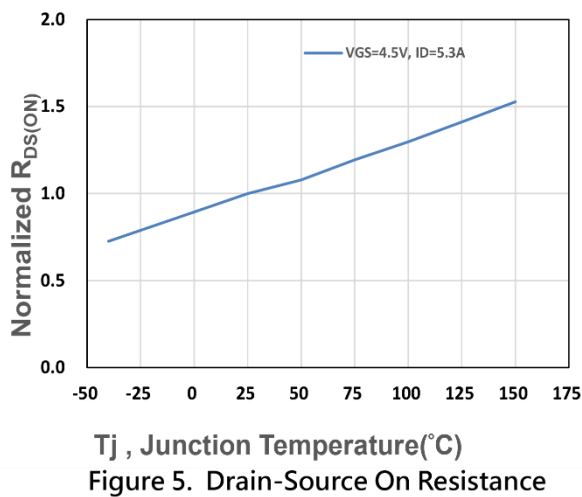
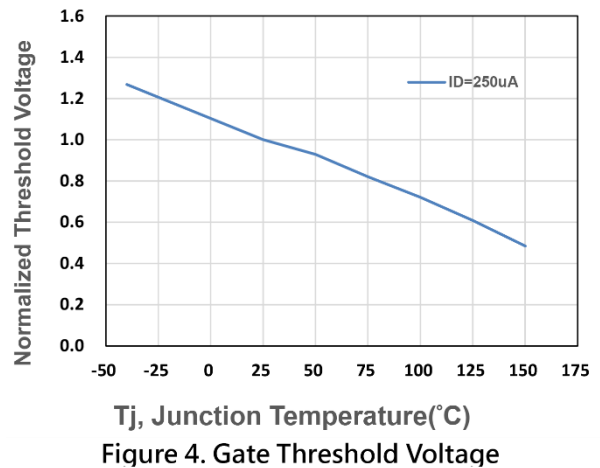
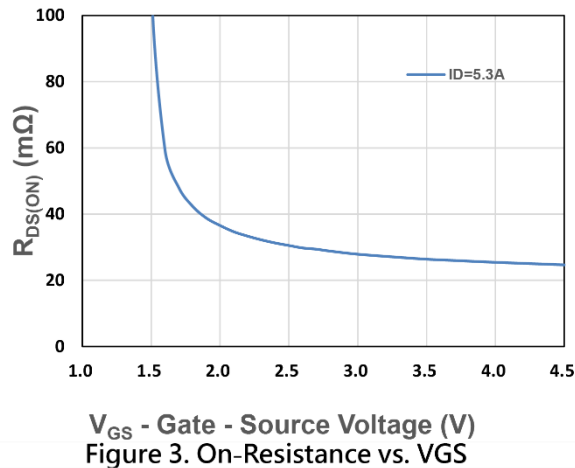
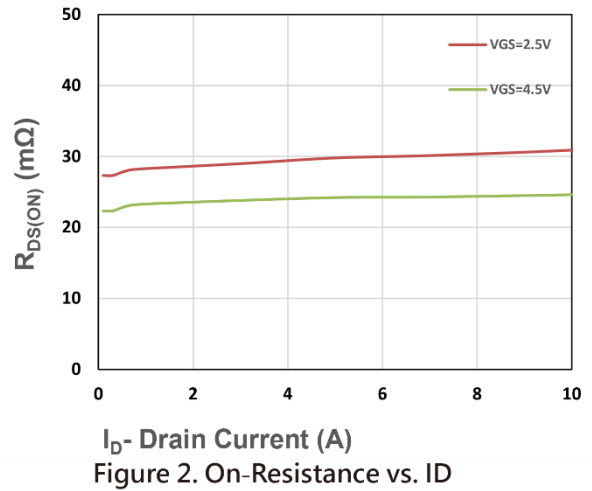
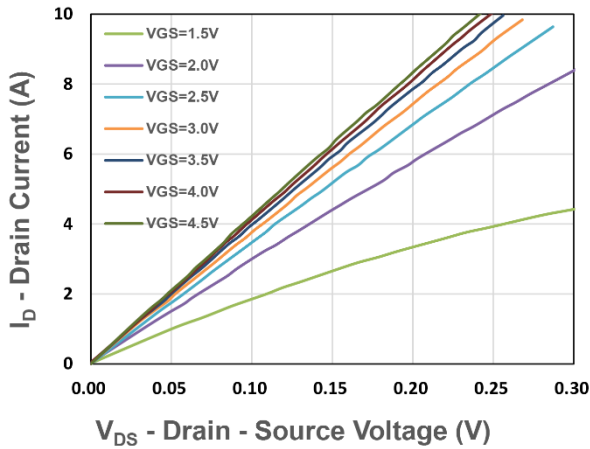
## Dual N-Channel Electrical Characteristics (T<sub>J</sub>=25°C Unless Otherwise Noted)

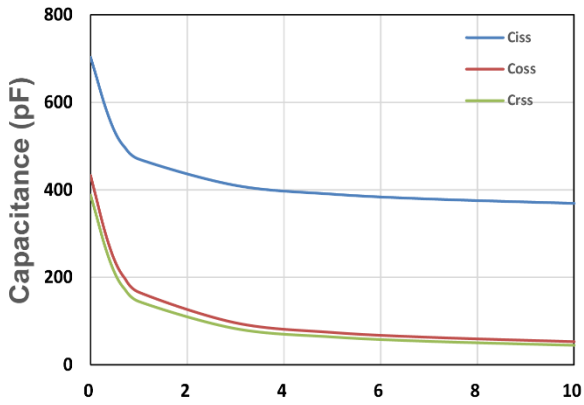
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Electrical Characteristics</b>						
<b>BV<sub>DSS</sub></b>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> =250uA	20	-	-	V
<b>I<sub>DSS</sub></b>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =16V, V <sub>GS</sub> =0V	-	-	1	uA
<b>V<sub>GS(th)</sub></b>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250uA	0.4	0.7	1.0	V
<b>I<sub>GSS</sub></b>	Gate Leakage Current	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>R<sub>DS(ON)</sub></b> <sup>④</sup>	Drain-Source On-state Resistance	V <sub>GS</sub> =4.5V, I <sub>DS</sub> =5.3A	-	24	30	mΩ
		V <sub>GS</sub> =2.5V, I <sub>DS</sub> =4.3A	-	30	40	
<b>gfs</b>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>DS</sub> =1A	-	5.7	-	S
<b>Dynamic Characteristics</b> <sup>⑥</sup>						
<b>R<sub>G</sub></b>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, Freq.=1MHz	-	1	-	Ω
<b>C<sub>iss</sub></b>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =10V, Freq.=1MHz	-	370	-	pF
<b>C<sub>OSS</sub></b>	Output Capacitance					
<b>C<sub>rss</sub></b>	Reverse Transfer Capacitance					
<b>t<sub>d(ON)</sub></b>	Turn-on Delay Time	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =1A, R <sub>GEN</sub> =6Ω	-	8	-	nS
<b>t<sub>r</sub></b>	Turn-on Rise Time					
<b>t<sub>d(OFF)</sub></b>	Turn-off Delay Time					
<b>t<sub>f</sub></b>	Turn-off Fall Time					
<b>Q<sub>g</sub></b>	Total Gate Charge	V <sub>GS</sub> =2.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =5.3A	-	3.5	-	nC
<b>Q<sub>g</sub></b>	Total Gate Charge	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =5.3A	-	6	-	
<b>Q<sub>gs</sub></b>	Gate-Source Charge		-	1.1	-	
<b>Q<sub>gd</sub></b>	Gate-Drain Charge		-	1.5	-	
<b>Source-Drain Characteristics</b>						
<b>V<sub>SD</sub></b> <sup>④</sup>	Diode Forward Voltage	I <sub>SD</sub> =1A, V <sub>GS</sub> =0V	-	0.8	1.1	V
<b>t<sub>rr</sub></b>	Reverse Recovery Time	I <sub>F</sub> =1A, V <sub>R</sub> =10V	-	12.8	-	nS
<b>Q<sub>rr</sub></b>	Reverse Recovery Charge	di <sub>F</sub> /dt=100A/μs	-	2.5	-	nC

Note ④ : Pulse test (pulse width≤300us, duty cycle≤2%).

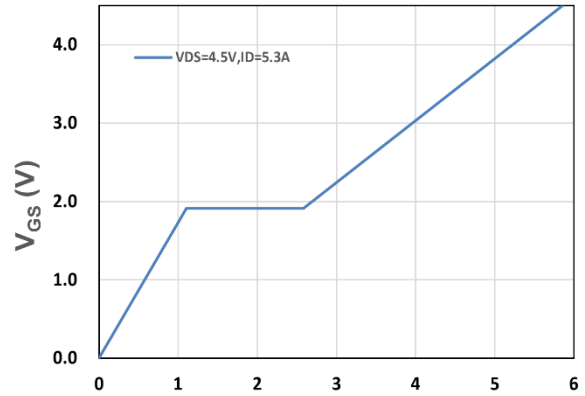
Note ⑤ : Guaranteed by design, not subject to production testing.

## Dual N-Channel Typical Characteristics

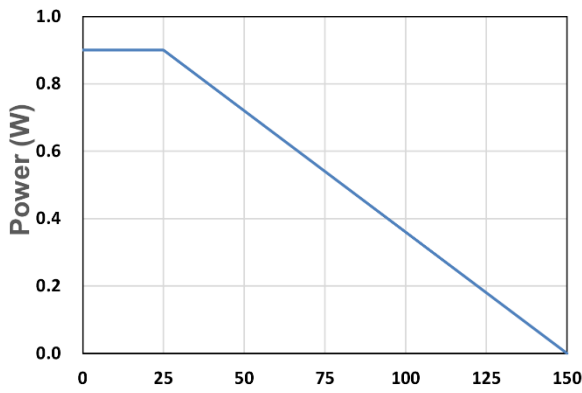




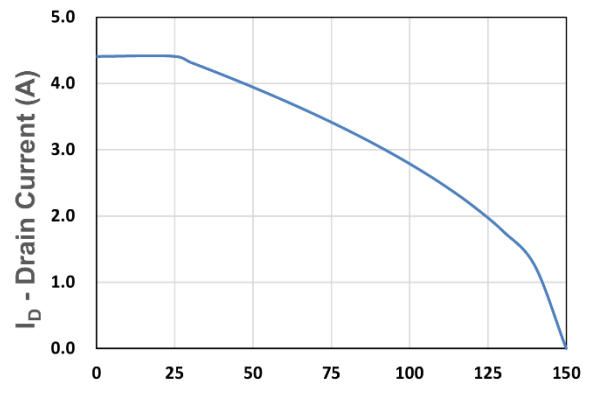
**V<sub>DS</sub> - Drain - Source Voltage (V)**  
Figure 7. Capacitance



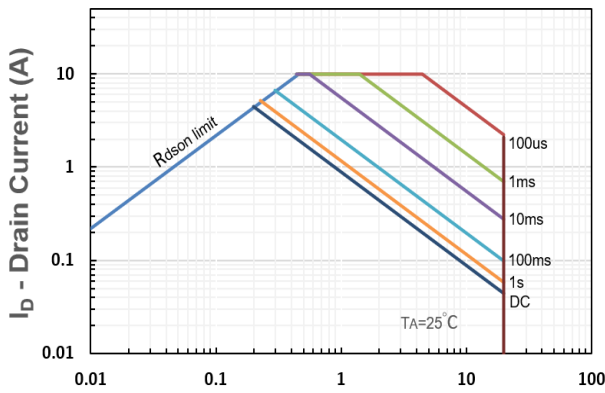
**Qg, Total Gate Charge (nC)**  
Figure 8. Gate Charge Characteristics



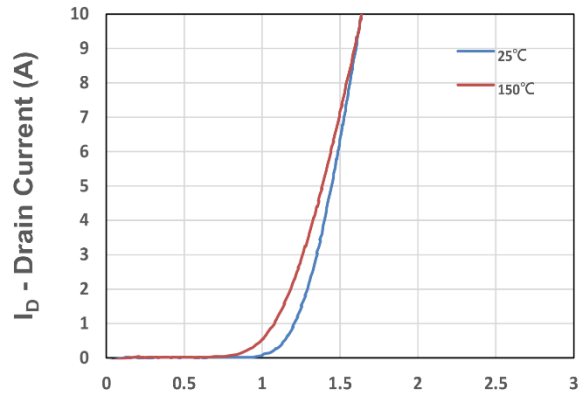
**T<sub>A</sub> - Ambien Temperature (°C)**  
Figure 9. Power Dissipation



**T<sub>A</sub> - Ambien Temperature (°C)**  
Figure 10. Drain Current



**V<sub>DS</sub> - Drain-Source Voltage (V)**  
Figure 11. Safe Operating Area



**V<sub>GS</sub> - Gate - Source Voltage (V)**  
Figure 12. Transfer Characteristics

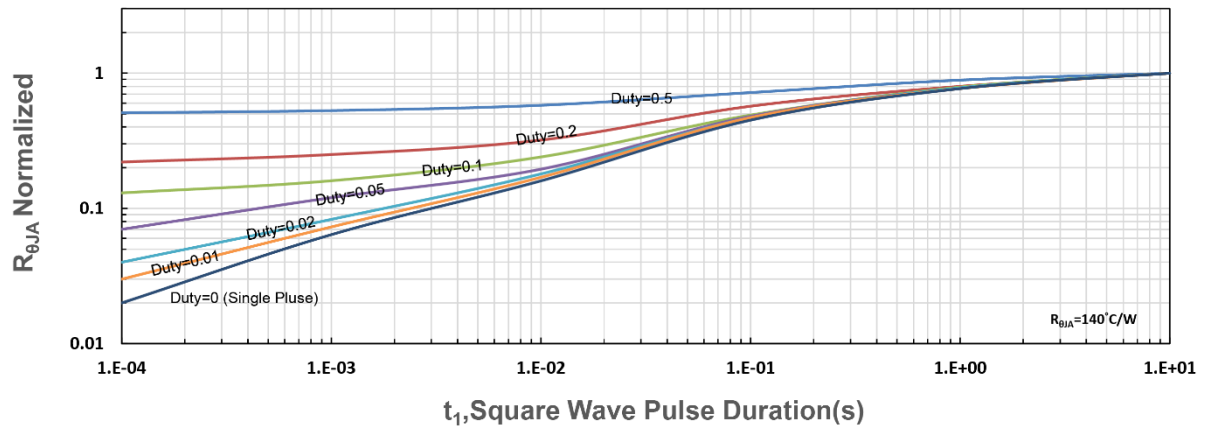


Figure 13.  $R_{\theta JA}$  Transient Thermal Impedance