

Complementary MOSFET

ELM3F601JA-S

■ General Description

ELM3F601JA-S uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge.

■ Features

- | | |
|--|---|
| N-channel | P-channel |
| • $V_{ds}=30V$ | $V_{ds}=-30V$ |
| • $I_d=7.3A$ | $I_d=-4.3A$ |
| • $R_{ds(on)} < 24m\Omega (V_{gs}=10V)$ | $R_{ds(on)} < 60m\Omega (V_{gs}=-10V)$ |
| • $R_{ds(on)} < 38m\Omega (V_{gs}=4.5V)$ | $R_{ds(on)} < 85m\Omega (V_{gs}=-4.5V)$ |

■ Maximum Absolute Ratings

$T_a=25^\circ C$. Unless otherwise noted.

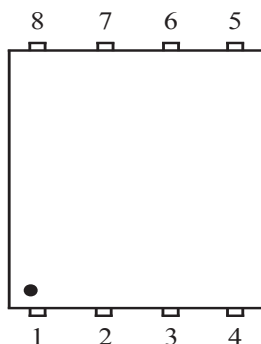
Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit	Note	
Drain-source voltage	V_{ds}	30	-30	V		
Gate-source voltage	V_{gs}	± 20	± 20	V		
Continuous drain current	I_d	$T_a=25^\circ C$	7.3	-4.3	A	2
		$T_a=70^\circ C$	5.8	-3.4		
Pulsed drain current	I_{dm}	60	-30	A	1	
Avalanche current	I_{as}	17.4	-18.0	A		
Avalanche energy	E_{as}	15.0	16.2	mJ		
Power dissipation	P_d	$T_c=25^\circ C$	2.0	1.7	W	
		$T_c=70^\circ C$	1.3	1.1		
Junction and storage temperature range	T_j, T_{stg}	-55 to 150		$^\circ C$		

■ Thermal Characteristics

Parameter	Symbol	Device	Typ.	Max.	Unit	Note
Maximum junction-to-case	$R_{\theta jc}$	N-ch		7.5	$^\circ C/W$	
		P-ch		8.0		
Maximum junction-to-ambient	$R_{\theta ja}$	N-ch		61.0	$^\circ C/W$	3
		P-ch		70.0		

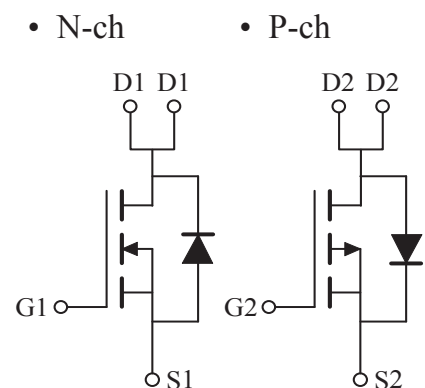
■ Pin configuration

PDFN-3x3(TOP VIEW)



Pin No.	Pin name
1	SOURCE1
2	GATE1
3	SOURCE2
4	GATE2
5	DRAIN2
6	DRAIN2
7	DRAIN1
8	DRAIN1

■ Circuit



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■Electrical Characteristics (N-ch)

Ta=25°C. Unless otherwise noted.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V	30			V	
Zero gate voltage drain current	Idss	Vds=24V, Vgs=0V			1	μA	
		Vds=20V, Vgs=0V, Ta=55°C			10		
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V			±100	nA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	1.0	1.5	2.5	V	
On state drain current	Id(on)	Vgs=10V, Vds=5V	60			A	4
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=8A		17	24	mΩ	4
		Vgs=4.5V, Id=6A		25	38		
Forward transconductance	Gfs	Vds=10V, Id=8A		22		S	4
Diode forward voltage	Vsd	If=8A, Vgs=0V			1	V	4
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=15V f=1MHz		591		pF	
Output capacitance	Coss			77		pF	
Reverse transfer capacitance	Crss			65		pF	
Gate resistance	Rg	Vgs=0V, Vds=0V, f=1MHz		3.5		Ω	
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=10V, Vds=15V Id=8A		13.0		nC	5
Gate-source charge	Qgs			2.5		nC	5
Gate-drain charge	Qgd			3.4		nC	5
Turn-on delay time	td(on)	Vgs=10V, Vds=15V Id=1A, Rgen=6Ω		14		ns	5
Turn-on rise time	tr			10		ns	5
Turn-off delay time	td(off)			30		ns	5
Turn-off fall time	tf			10		ns	5
Body-diode reverse recovery time	trr	If=8A, dIf/dt=100A/μs		12.4		ns	
Body-diode reverse recovery charge	Qrr			3.2		nC	

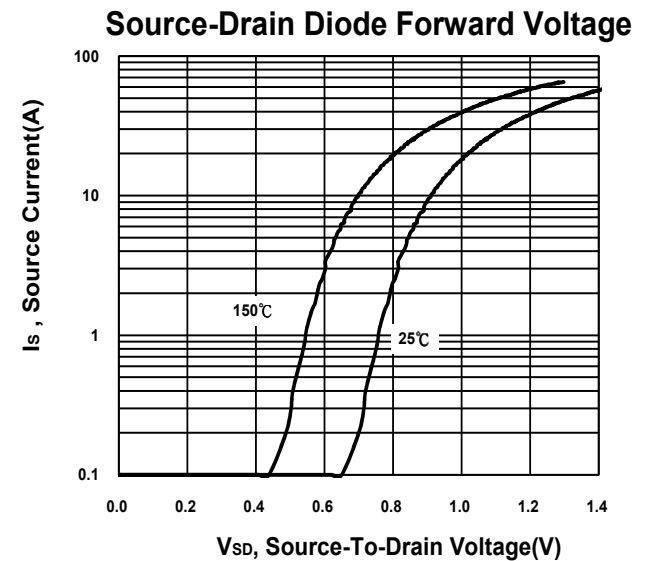
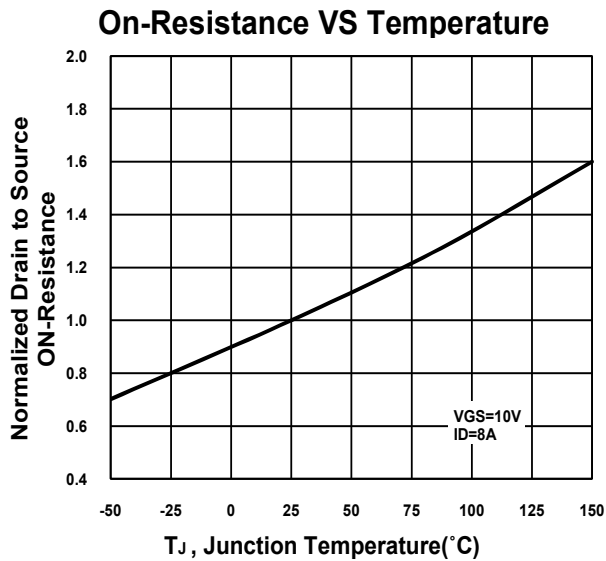
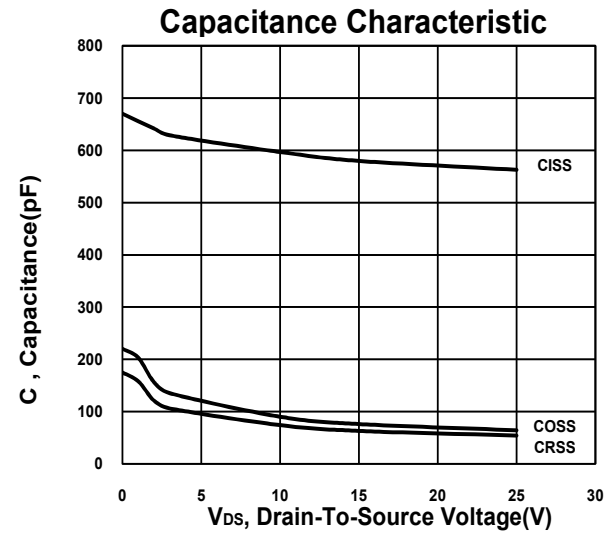
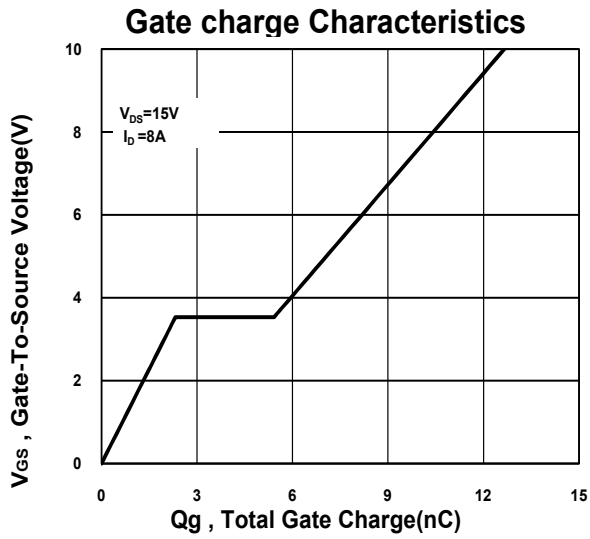
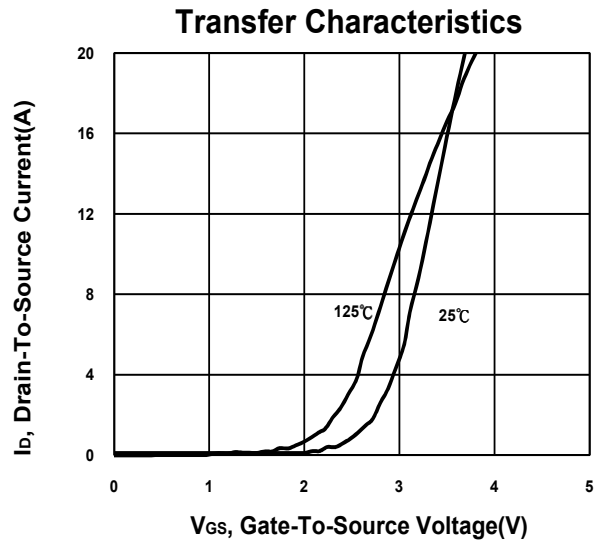
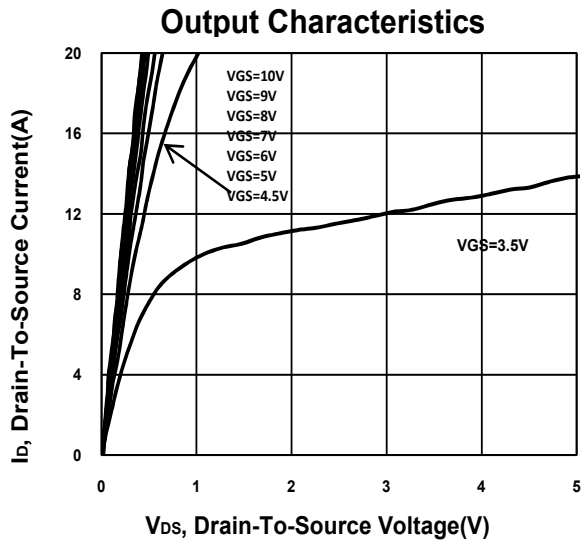
NOTE :

1. Pulse width limited by maximum junction temperature.
2. Package limitation current is 30A.
3. The value of Rθja is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with Ta=25°C.
4. Pulse test : Pulse Width≤300 μsec, Duty Cycle≤2%.
5. Independent of operating temperature.

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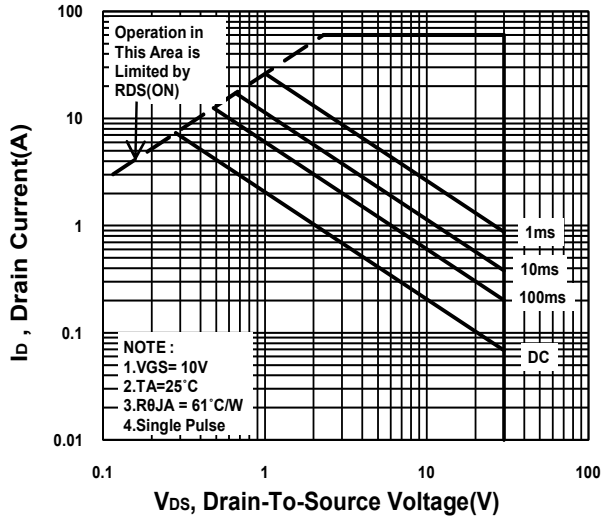
■ Typical Electrical and Thermal Characteristics (N-ch)



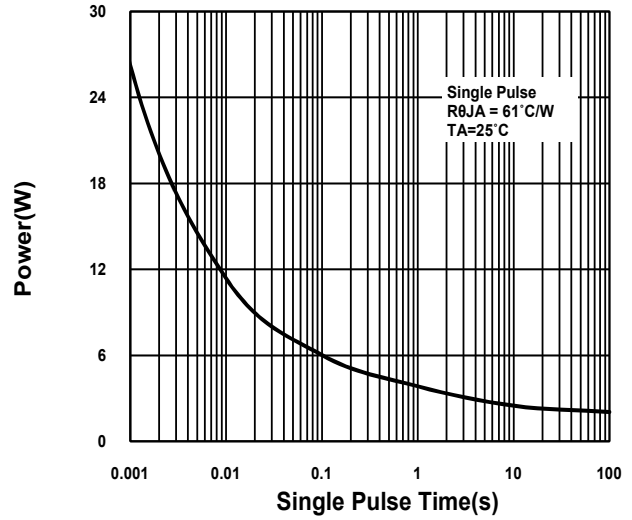
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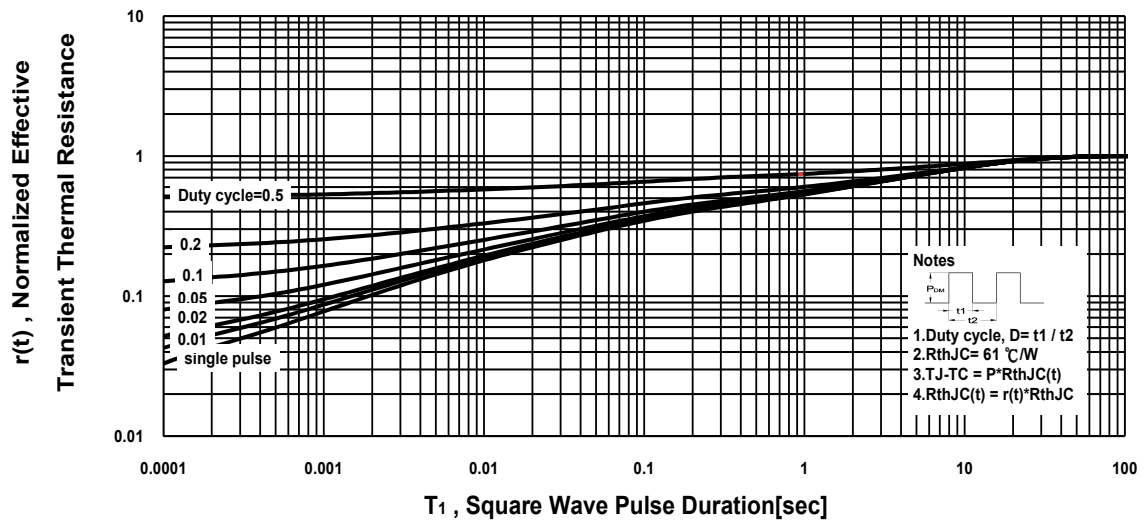
Safe Operating Area



Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve



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■Electrical Characteristics (P-ch)

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STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Id=-250μA, Vgs=0V	-30			V	
Zero gate voltage drain current	Idss	Vds=-24V, Vgs=0V			-1	μA	
		Vds=-20V, Vgs=0V, Ta=55°C			-10		
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V			±100	nA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250μA	-1.0	-1.5	-2.5	V	
On state drain current	Id(on)	Vgs=-10V, Vds=-5V	-30			A	4
Static drain-source on-resistance	Rds(on)	Vgs=-10V, Id=-4.5A		38	60	mΩ	4
		Vgs=-4.5V, Id=-3.5A		54	85		
Forward transconductance	Gfs	Vds=-10V, Id=-4.5A		11		S	4
Diode forward voltage	Vsd	If=-4.5A, Vgs=0V			-1.1	V	4
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=-15V f=1MHz		548		pF	
Output capacitance	Coss			87		pF	
Reverse transfer capacitance	Crss			86		pF	
Gate resistance	Rg	Vgs=0V, Vds=0V, f=1MHz		12		Ω	
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=-10V, Vds=-15V Id=-4.5A		14.0		nC	5
Gate-source charge	Qgs			2.0		nC	5
Gate-drain charge	Qgd			3.5		nC	5
Turn-on delay time	td(on)	Vgs=-10V, Vds=-15V Id=-1A, Rgen=6Ω		16		ns	5
Turn-on rise time	tr			13		ns	5
Turn-off delay time	td(off)			35		ns	5
Turn-off fall time	tf			14		ns	5
Body-diode reverse recovery time	trr	If=-4.5A, dIf/dt=100A/μs		16.7		ns	
Body-diode reverse recovery charge	Qrr			4.5		nC	

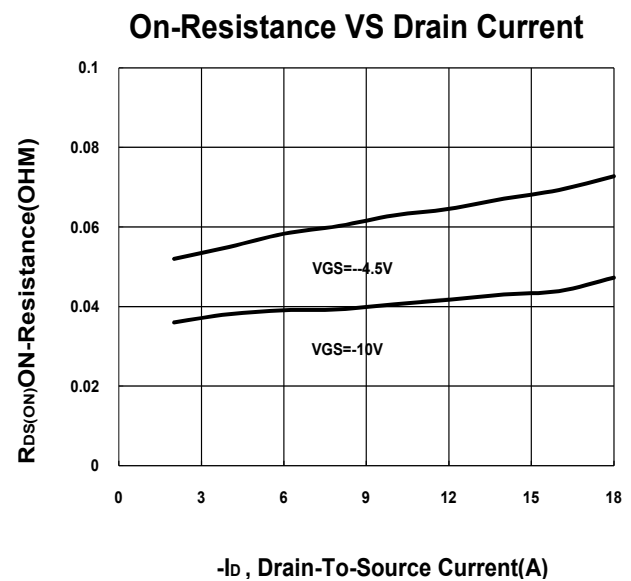
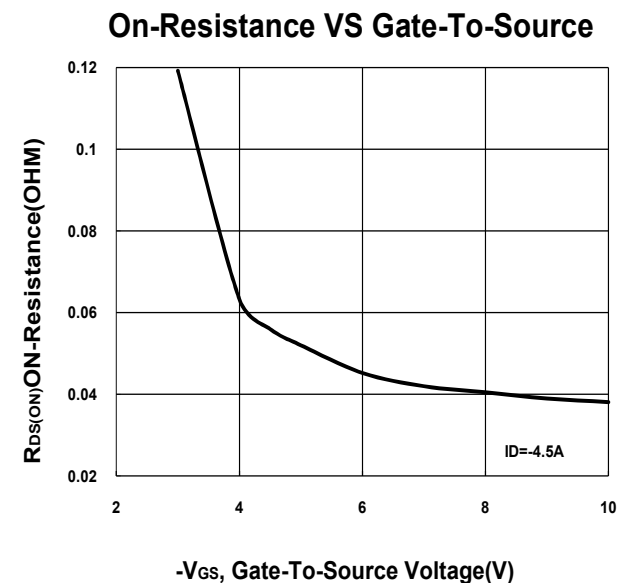
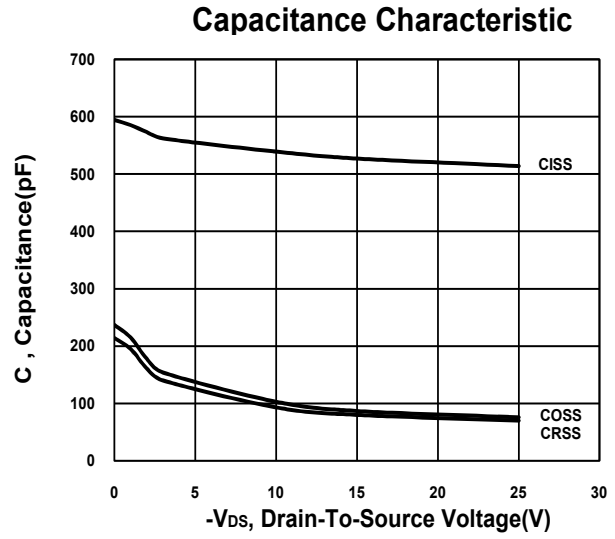
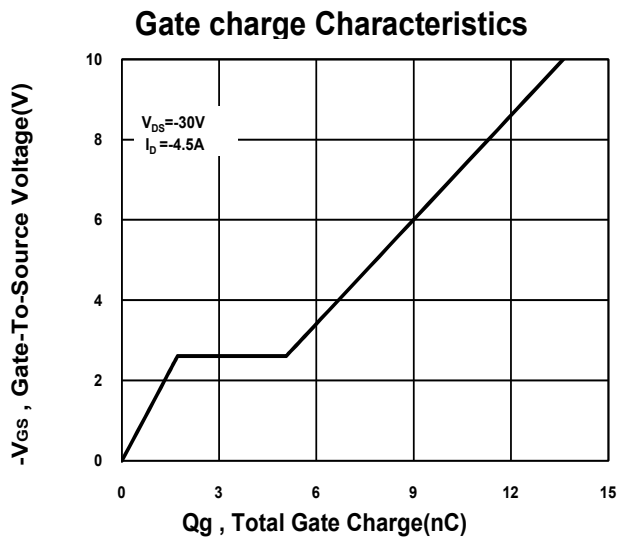
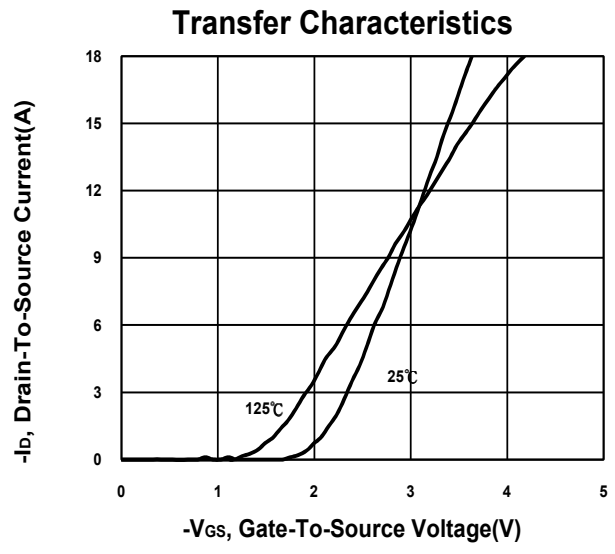
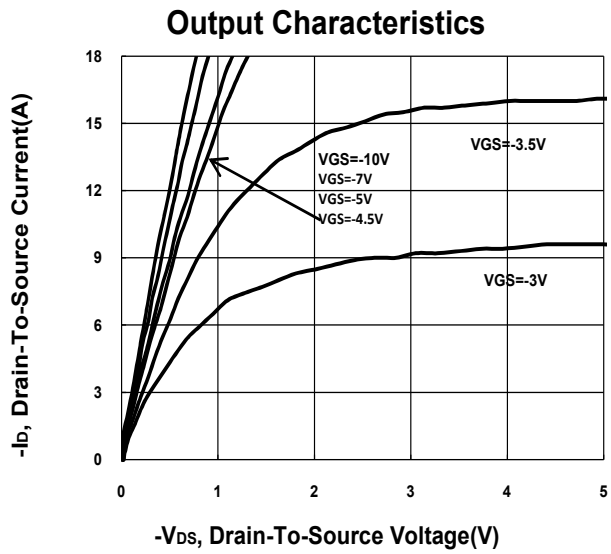
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