

N-Channel 40 V (D-S) MOSFET



RoHS
COMPLIANT

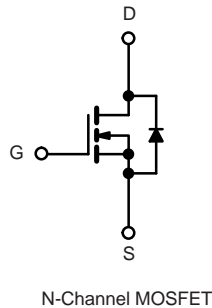
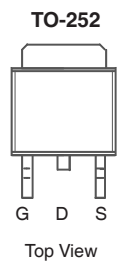
PRODUCT SUMMARY		
V _{DS} (V)	R _{DS(on)} (mΩ)(Typ.)	I _D (A) ^a (Max.)
40	1.7 at V _{GS} = 10 V	180
	2.4 at V _{GS} = 4.5 V	120

FEATURES

- 175 °C Junction Temperature
- DT-Trench Power MOSFET

APPLICATIONS

- DC Motor Driver
- Synchronous Rectification in DC/DC and AC/DC Converters



ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Gate-Source Voltage		V _{GS}	± 20	V
Continuous Drain Current (T _J = 175 °C) ^b	T _C = 25 °C	I _D	180	A
	T _C = 100 °C		105 ^a	
Pulsed Drain Current		I _{DM}	720	
Continuous Source Current (Diode Conduction)		I _S	180	
Avalanche Current		I _{AS}	178	
Single Avalanche Energy (Duty Cycle ≤ 1 %)	L = 0.1 mH	E _{AS}	405 ^c	mJ
Maximum Power Dissipation	T _C = 25 °C	P _D	206	W
	T _A = 25 °C		3.5 ^b , 8.8 ^{b, c}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	t ≤ 10 sec	R _{thJA}	13	18	°C/W
	Steady State		35	50	
Maximum Junction-to-Case		R _{thJC}	0.6	1.0	

Notes:

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- t ≤ 10 s.

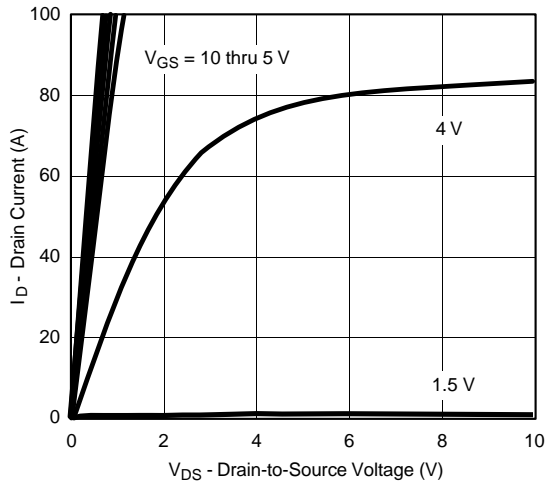
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1		3	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			250	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	180			A
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		1.7	2.5	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		2.4	3.8	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 5\text{ V}, I_D = 20\text{ A}$		110		S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		2750		pF
Output Capacitance	C_{oss}			493		
Reverse Transfer Capacitance	C_{rss}			65		
Total Gate Charge ^c	Q_g	$V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		67	90	nC
Gate-Source Charge ^c	Q_{gs}			20		
Gate-Drain Charge ^c	Q_{gd}			15.5		
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 20\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D = 20\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$		11		ns
Rise Time ^c	t_r			16		
Turn-Off Delay Time ^c	$t_{d(off)}$			35		
Fall Time ^c	t_f			20		
Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^\circ\text{C}$)						
Pulsed Current	I_{SM}				280	A
Diode Forward Voltage	V_{SD}	$I_F = 1\text{ A}, V_{GS} = 0\text{ V}$		1	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 20\text{ A}, di/dt = 500\text{ A}/\mu\text{s}$		45	100	ns
Reverse Recovery Charge	Q_{rr}	$I_F = 20\text{ A}, di/dt = 500\text{ A}/\mu\text{s}$		45	100	ns

Notes:

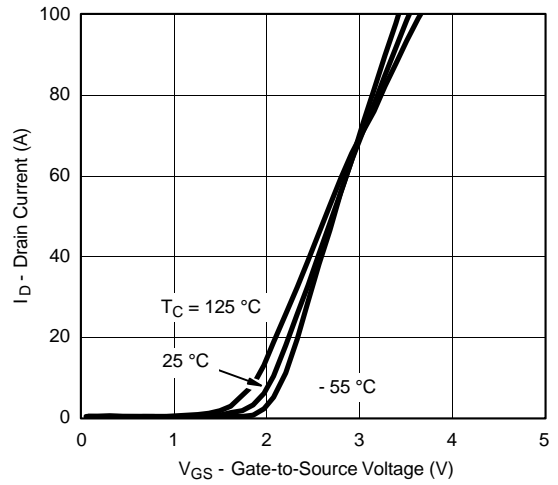
- a. For design aid only; not subject to production testing.
- b. Pulse test; pulse width 300 μs , duty cycle 2 %.
- c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

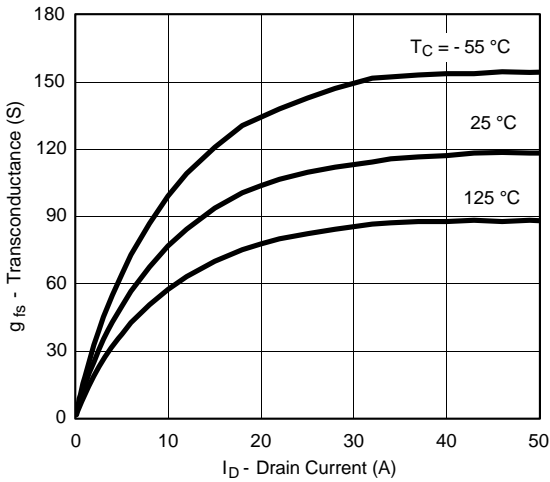
TYPICAL CHARACTERISTICS (25 °C unless noted)



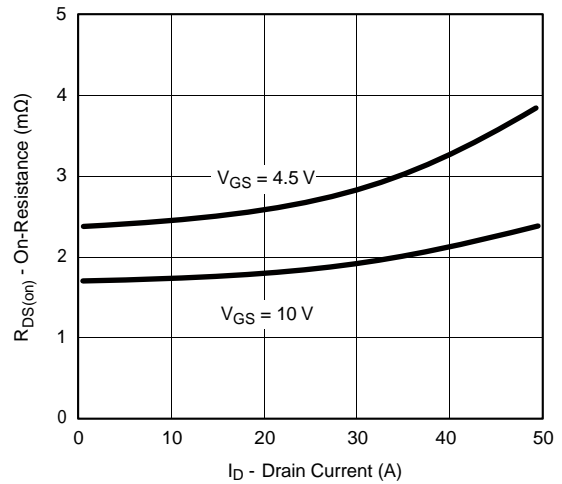
Output Characteristics



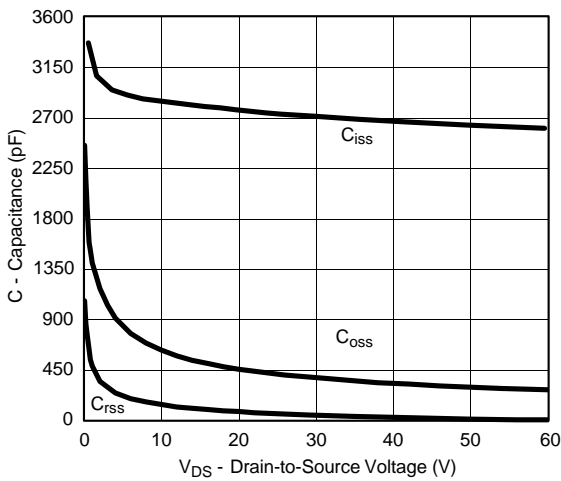
Transfer Characteristics



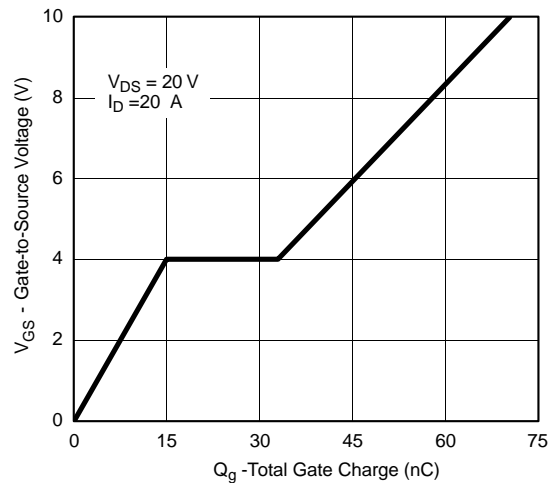
Transconductance



On-Resistance vs. Drain Current

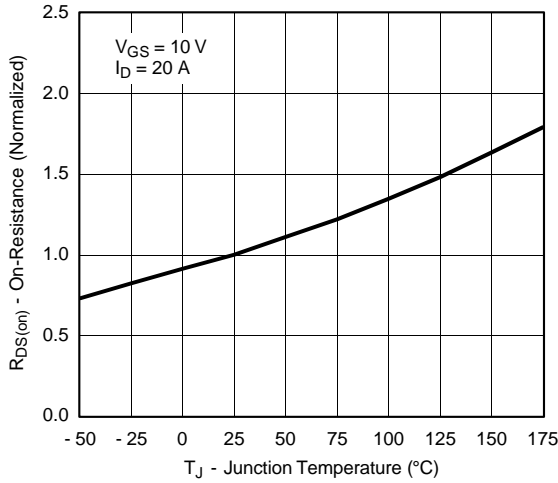


Capacitance

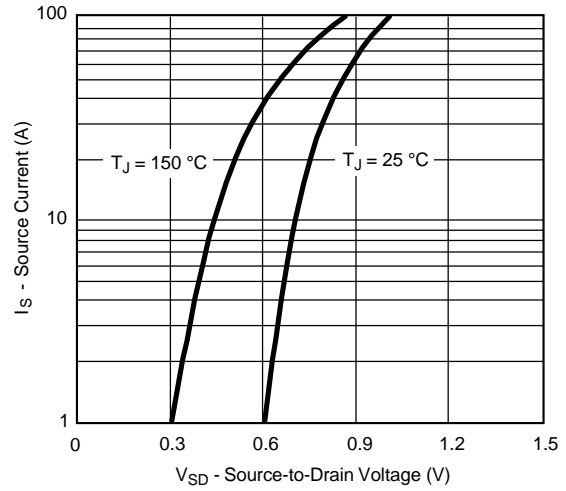


Gate Charge

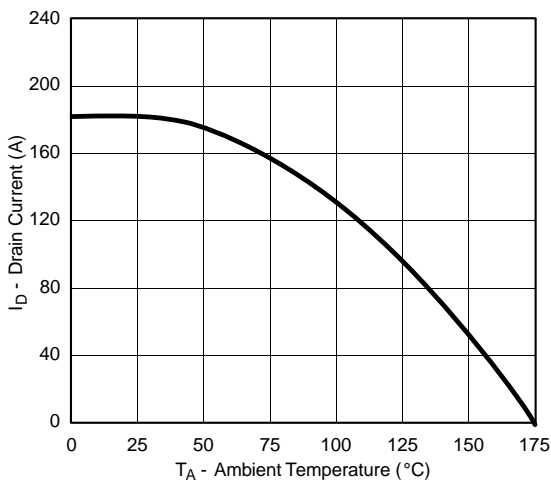
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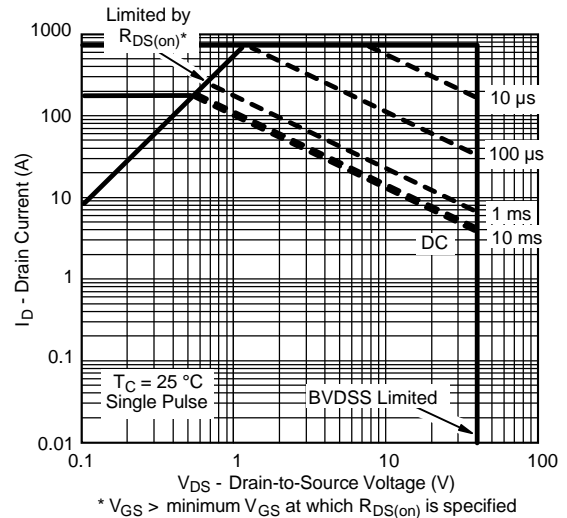
On-Resistance vs. Junction Temperature



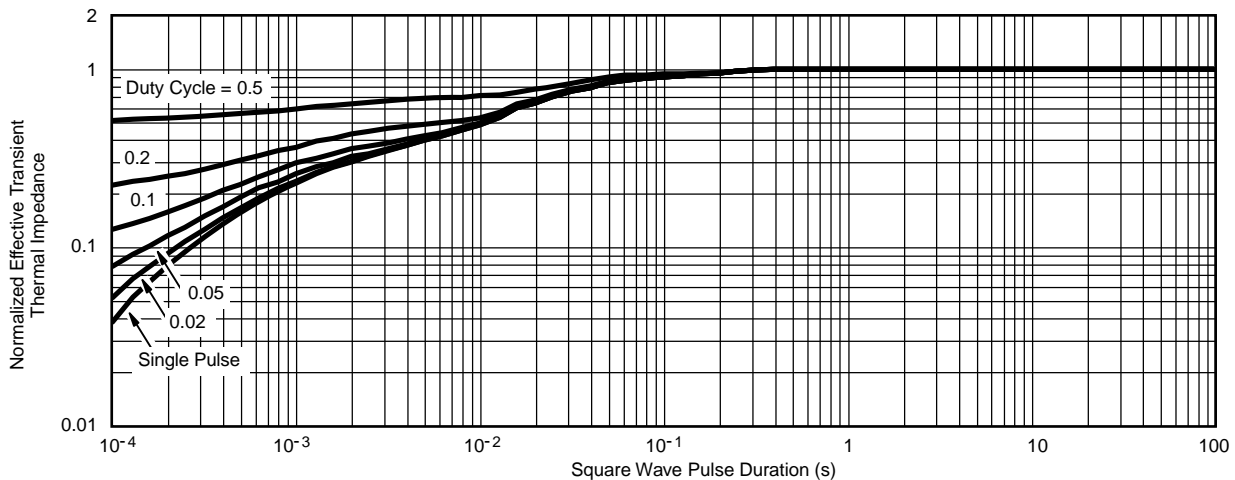
Source-Drain Diode Forward Voltage



Maximum Drain Current vs. Ambient Temperature

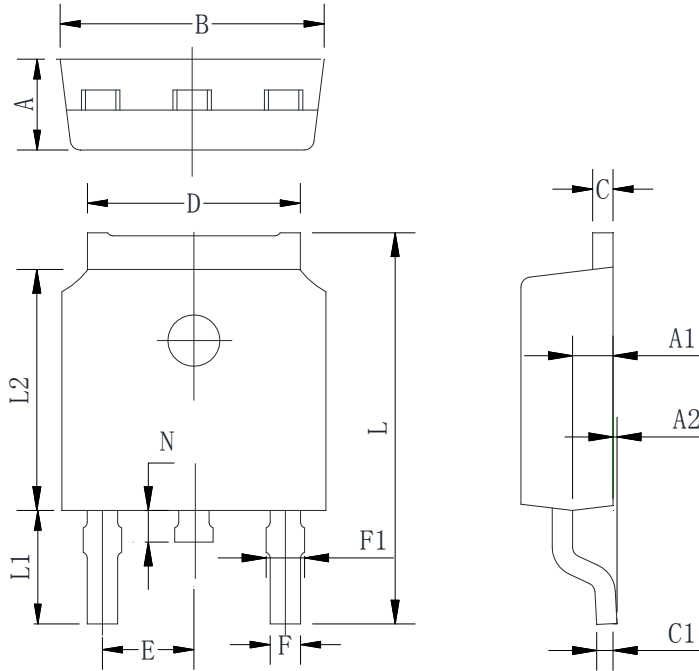


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

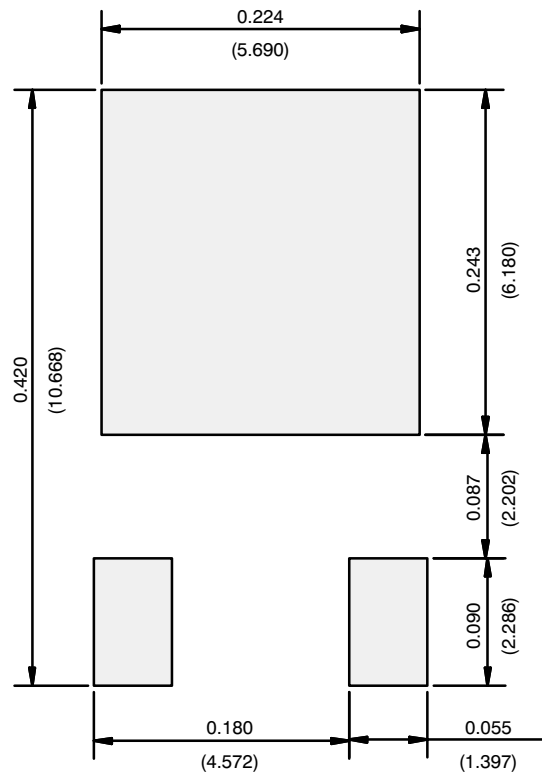
TO-252-2L PACKAGE OUTLINE DIMENSIONS



UNIT: mm

Symbol	Min	Typ	Max
A	2.20	2.30	2.40
A1	0.91	1.01	1.11
A2	0.05	0.15	0.25
B	6.45	6.60	6.75
C	0.45	0.50	0.58
C1	0.45	0.50	0.58
D	5.12	5.32	5.52
E	2.286 TYP		
F	0.66	0.76	0.86
F1	0.66	0.86	1.06
L	9.60	9.90	10.20
L1	2.6	2.8	3.0
L2	5.95	6.10	6.25
N	0.60	0.80	1.00

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

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