

N- and P-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY				
	V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
N-Channel	30	0.0155 at V _{GS} = 10 V	30	25
		0.021 at V _{GS} = 4.5 V	26	
P-Channel	- 30	0.040 at V _{GS} = - 10 V	- 18	17
		0.063 at V _{GS} = - 4.5 V	- 10	

FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested

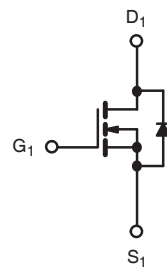
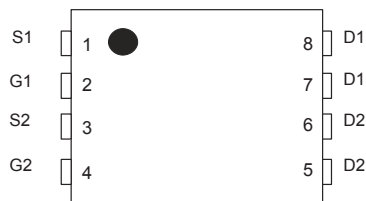


RoHS
COMPLIANT

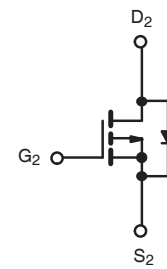
APPLICATIONS

- DC/DC for portable applications
- Load switch

Top View



N-Channel MOSFET



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted

Parameter	Symbol	N-Channel	P-Channel	Unit	
Drain-Source Voltage	V _{DS}	30	- 30	V	
Gate-Source Voltage	V _{GS}	± 20	± 20		
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	30	- 18	A
		T _C = 70 °C	26	- 10	
		T _A = 25 °C	13 ^{b, c}	- 4.5 ^{b, c}	
		T _A = 70 °C	8 ^{b, c}	- 2.8 ^{b, c}	
Pulsed Drain Current (10 μs Pulse Width)	I _{DM}	120	-72	A	
Source-Drain Current Diode Current	I _S	T _C = 25 °C	30		- 15
		T _A = 25 °C	24 ^{b, c}		- 11 ^{b, c}
Pulsed Source-Drain Current	I _{SM}	120	- 60		mJ
Single Pulse Avalanche Current	L = 0.1 mH I _{AS}	22	- 10		
Single Pulse Avalanche Energy	E _{AS}	4.5	18	W	
Maximum Power Dissipation	P _D	T _C = 25 °C	26		20
		T _C = 70 °C	17		9
		T _A = 25 °C	8.8 ^{b, c}		5.6 ^{b, c}
		T _A = 70 °C	6 ^{b, c}	3.9 ^{b, c}	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 175		°C	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	N-Channel		P-Channel		Unit
		Typ.	Max.	Typ.	Max.	
Maximum Junction-to-Ambient ^{b, d}	t ≤ 10 s R _{thJA}	50	75	47	80	°C/W
Maximum Junction-to-Foot (Drain)	Steady State R _{thJF}	30	50	29	55	

Notes:

a. Based on T_C = 25 °C.

b. Surface Mounted on 1" x 1" FR4 board.

c. t = 10 s.

d. Maximum under Steady State conditions is 120 °C/W (N-Channel) and 110 °C/W (P-Channel).

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}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	N-Ch	30		V	
		$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	P-Ch	-30			
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$	N-Ch		40	mV/ $^\circ\text{C}$	
		$I_D = -250\text{ }\mu\text{A}$	P-Ch		-40		
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	$I_D = 250\text{ }\mu\text{A}$	N-Ch		-4.1		
		$I_D = -250\text{ }\mu\text{A}$	P-Ch		5.0		
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	N-Ch	1.0		3.0	V
		$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	P-Ch	-1.0		-3.0	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	N-Ch			± 100	nA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	P-Ch			± 100	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}$	N-Ch			1	μA
		$V_{DS} = -24\text{ V}, V_{GS} = 0\text{ V}$	P-Ch			-1	
		$V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	N-Ch			10	
		$V_{DS} = -24\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	P-Ch			-10	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} = 24\text{ V}, V_{GS} = 10\text{ V}$	N-Ch	30		A	
		$V_{DS} = -24\text{ V}, V_{GS} = -10\text{ V}$	P-Ch	-15			
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$	N-Ch		0.0155	0.019	Ω
		$V_{GS} = -10\text{ V}, I_D = -8\text{ A}$	P-Ch		0.040	0.045	
		$V_{GS} = 4.5\text{ V}, I_D = 8\text{ A}$	N-Ch		0.021	0.026	
		$V_{GS} = -4.5\text{ V}, I_D = 8\text{ A}$	P-Ch		0.063	0.072	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 24\text{ V}, I_D = 10\text{ A}$	N-Ch		25	S	
		$V_{DS} = -24\text{ V}, I_D = -5\text{ A}$	P-Ch		21		
Dynamic^a							
Input Capacitance	C_{iss}	N-Channel $V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	N-Ch		1169	pF	
Output Capacitance	C_{oss}		P-Ch		778		
Reverse Transfer Capacitance	C_{rss}	P-Channel $V_{DS} = -24\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	N-Ch		280		
			P-Ch		223		
Total Gate Charge	Q_g	$V_{DS} = 24\text{ V}, V_{GS} = 10\text{ V}, I_D = 10\text{ A}$	N-Ch		17	26	nC
		$V_{DS} = -24\text{ V}, V_{GS} = -10\text{ V}, I_D = -10\text{ A}$	P-Ch		25	42	
		N-Channel $V_{DS} = 24\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$	N-Ch		12	20	
			P-Ch		19	25	
Gate-Source Charge	Q_{gs}	P-Channel $V_{DS} = -24\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -10\text{ A}$	N-Ch		3		
			P-Ch		4.1		
Gate-Drain Charge	Q_{gd}		N-Ch		2.3		
			P-Ch		3.5		
Gate Resistance	R_g	$f = 1\text{ MHz}$	N-Ch	0.3	1.7	3.0	Ω
			P-Ch	1.3	6.5	12.8	

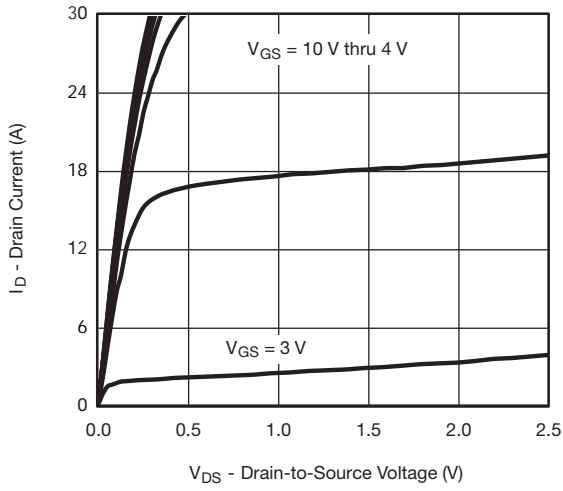
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted								
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit		
Dynamic^a								
Turn-On Delay Time	$t_{d(on)}$	N-Channel $V_{DD} = 24\text{ V}, R_L = 2\ \Omega$ $I_D \cong 10\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\ \Omega$	N-Ch		11	20	ns	
Rise Time	t_r		P-Ch		10	19		
Turn-Off Delay Time	$t_{d(off)}$	P-Channel $V_{DD} = -24\text{ V}, R_L = 2\ \Omega$ $I_D \cong -10\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\ \Omega$	N-Ch		5	10		
			P-Ch		7	15		
Fall Time	t_f		N-Ch		23	39		
			P-Ch		45	90		
Turn-On Delay Time	$t_{d(on)}$		N-Ch		9	18		
			P-Ch		15	28		
Rise Time	t_r		N-Channel $V_{DD} = 24\text{ V}, R_L = 2\ \Omega$ $I_D \cong 10\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\ \Omega$	N-Ch		14		28
				P-Ch		35		70
Turn-Off Delay Time	$t_{d(off)}$	N-Ch			10	22		
		P-Ch			42	75		
Fall Time	t_f	N-Ch			25	47		
		P-Ch			40	78		
Continuous Source-Drain Diode Current	I_S	P-Channel $V_{DD} = -24\text{ V}, R_L = 2\ \Omega$ $I_D \cong -10\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\ \Omega$		N-Ch		13		26
				P-Ch		15		30
Drain-Source Body Diode Characteristics								
Continuous Source-Drain Diode Current	I_S		$T_C = 25\text{ }^\circ\text{C}$	N-Ch			30	A
				P-Ch			-18	
Pulse Diode Forward Current ^a	I_{SM}			N-Ch			120	
				P-Ch			-72	
Body Diode Voltage	V_{SD}		$I_S = 2\text{ A}$ $I_S = -2\text{ A}$	N-Ch		0.75	1.2	V
				P-Ch		-0.8	-1.2	
Body Diode Reverse Recovery Time	t_{rr}		N-Channel $I_F = 5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$ P-Channel $I_F = -5\text{ A}, di/dt = -100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$	N-Ch		18	35	ns
Body Diode Reverse Recovery Charge	Q_{rr}			P-Ch		35	60	
				N-Ch		15	25	nC
P-Ch				27	52			
Reverse Recovery Fall Time	t_a			N-Ch		10		ns
				P-Ch		15		
Reverse Recovery Rise Time	t_b		N-Ch		7			
		P-Ch		15				

Notes:

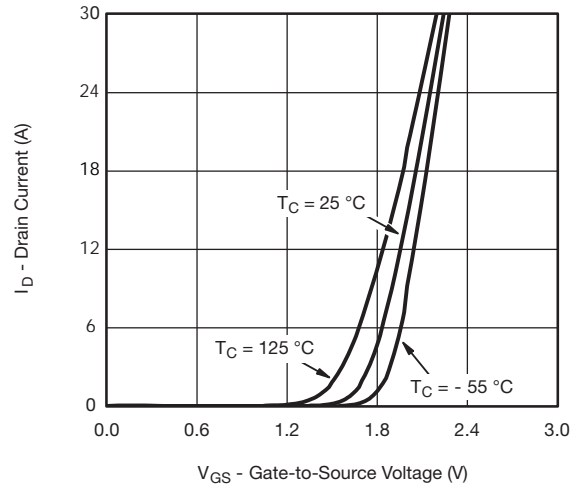
- a. Guaranteed by design, not subject to production testing.
- b. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.

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.

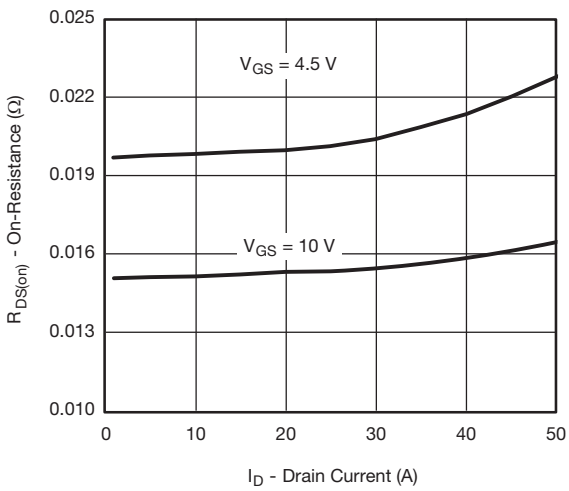
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



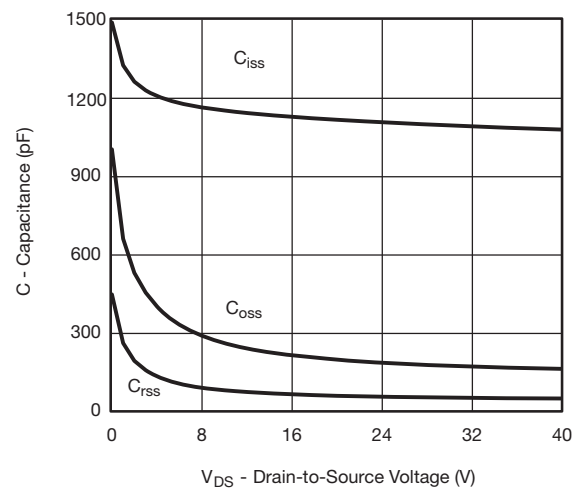
Output Characteristics



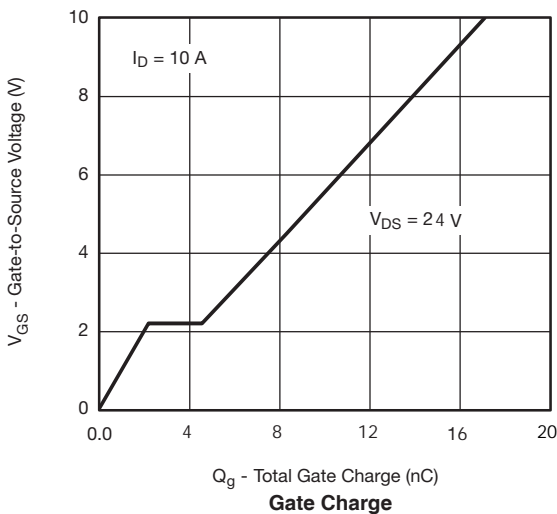
Transfer Characteristics



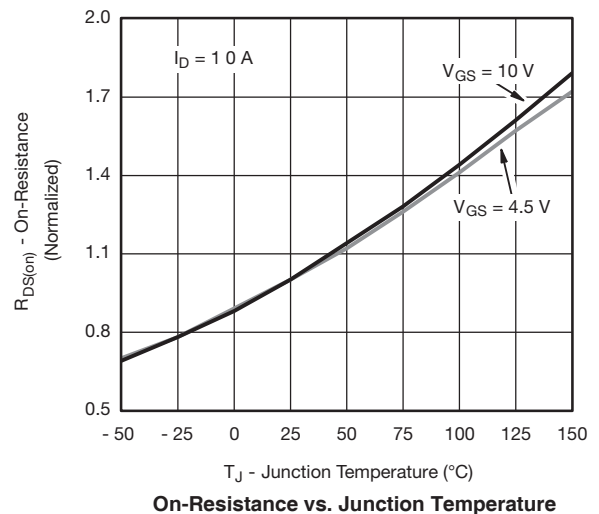
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

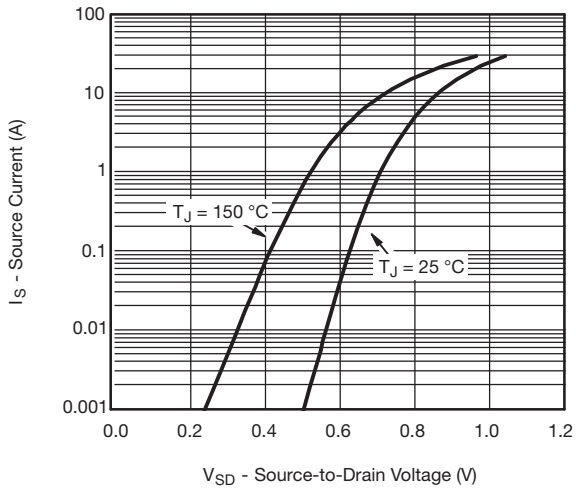


Gate Charge

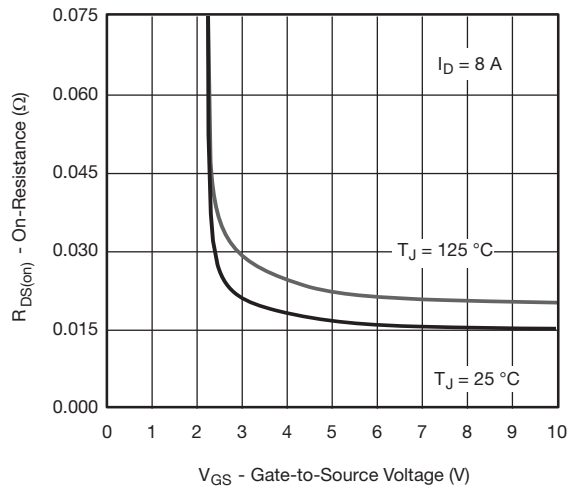


On-Resistance vs. Junction Temperature

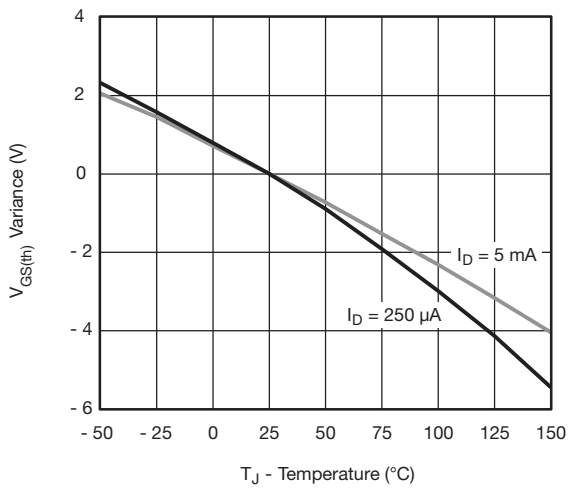
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



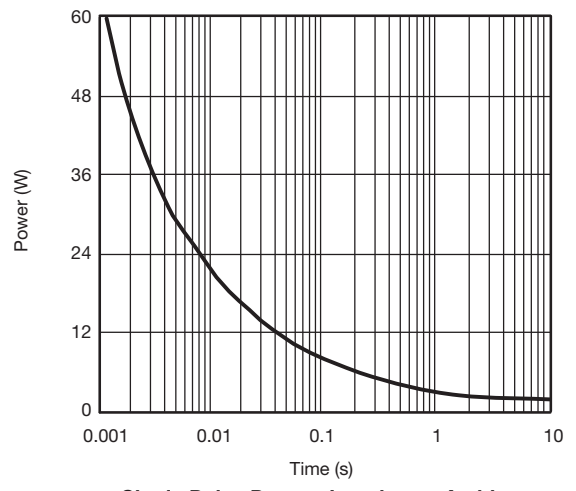
Source-Drain Diode Forward Voltage



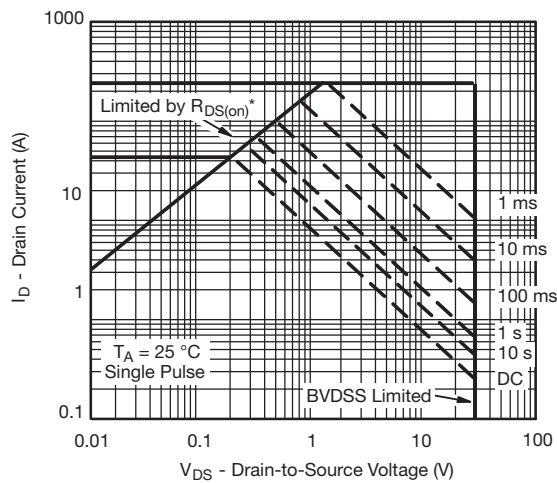
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



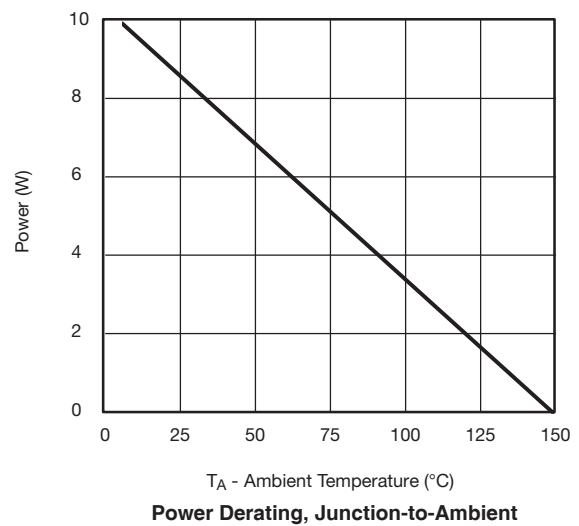
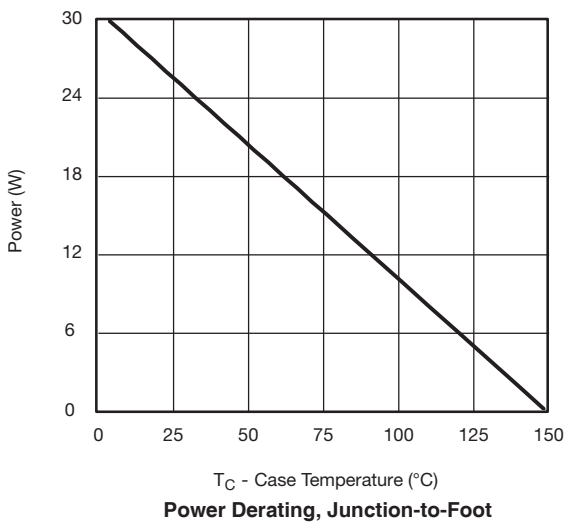
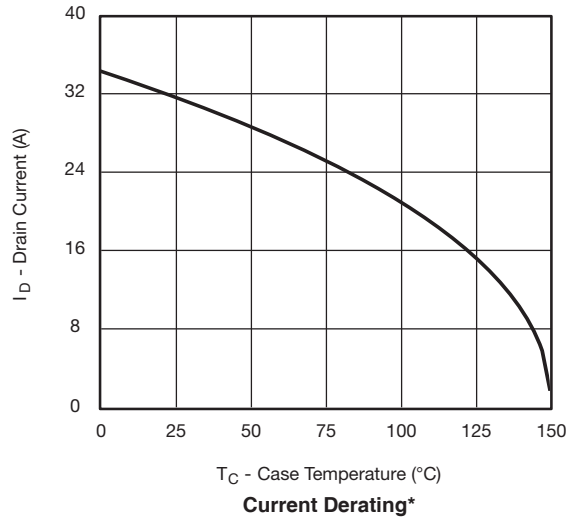
Single Pulse Power, Junction-to-Ambient



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specific

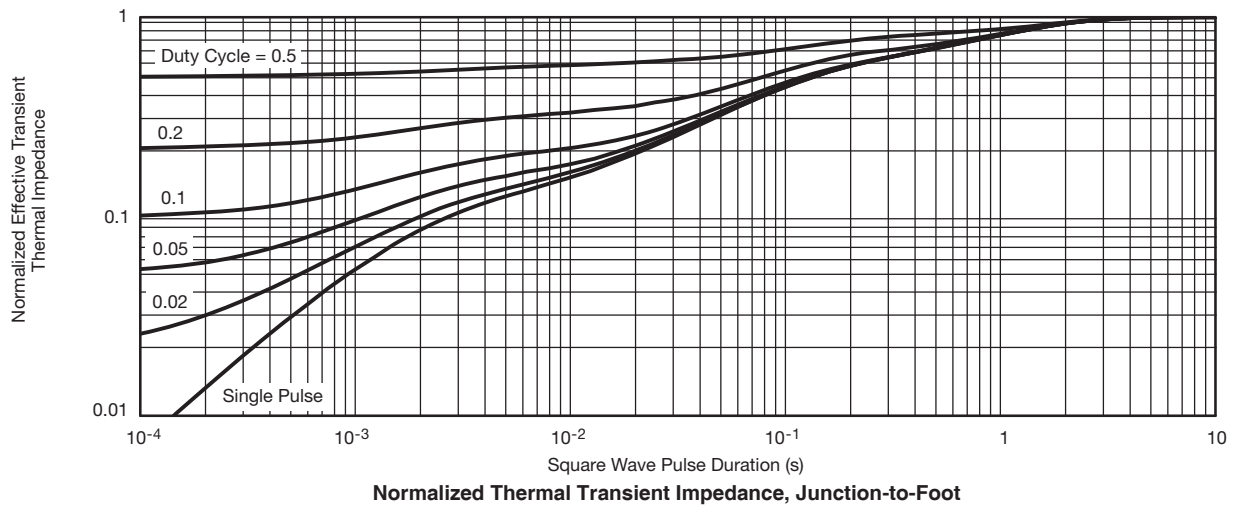
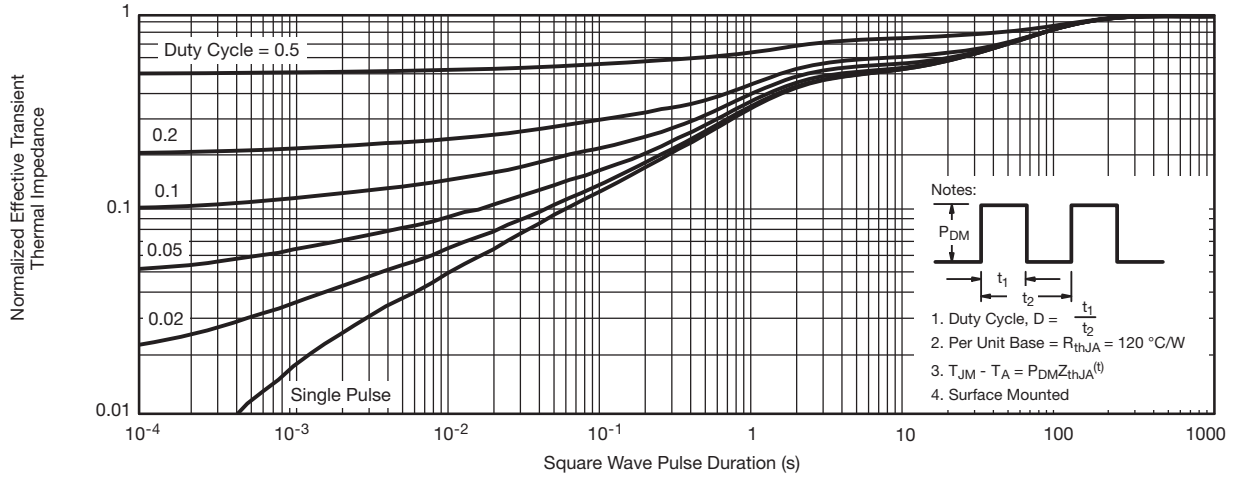
Safe Operating Area, Junction-to-Ambient

N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

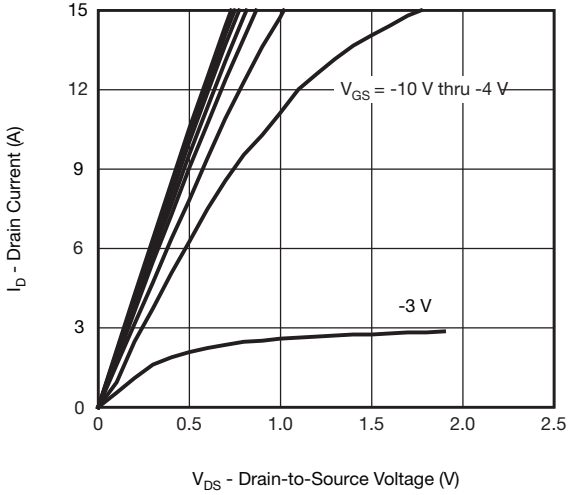


* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

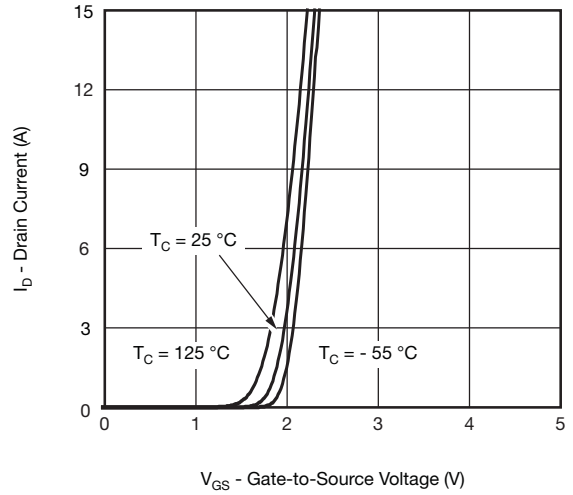
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



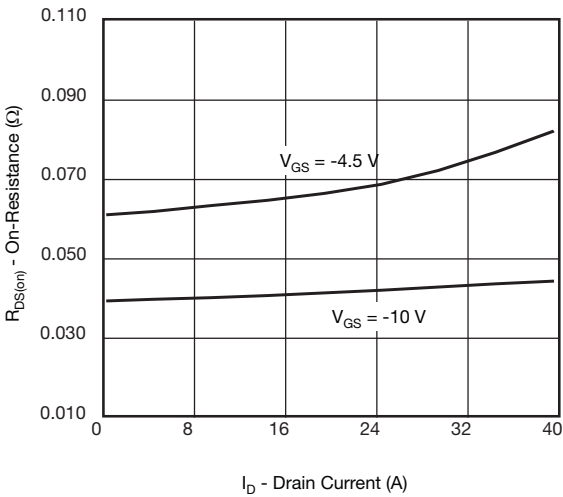
P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



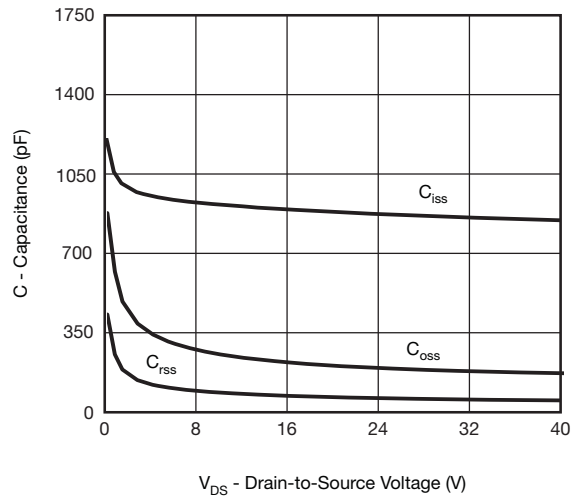
Output Characteristics



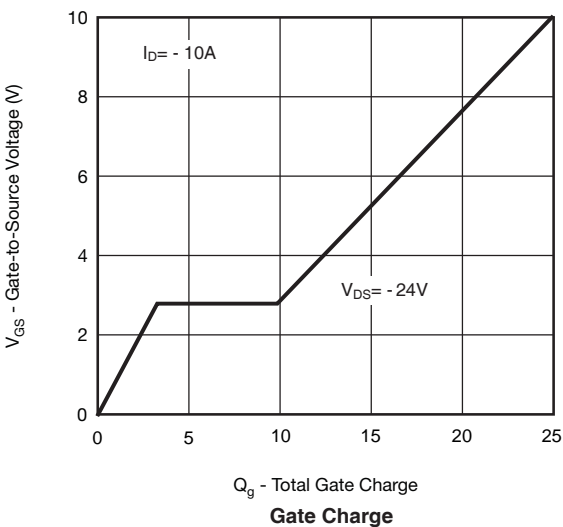
Transfer Characteristics



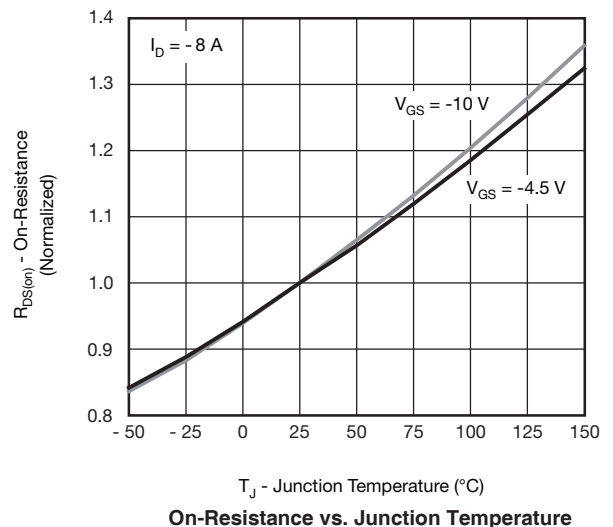
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

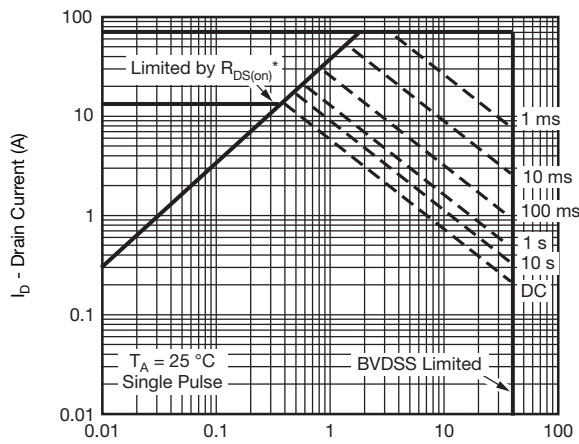
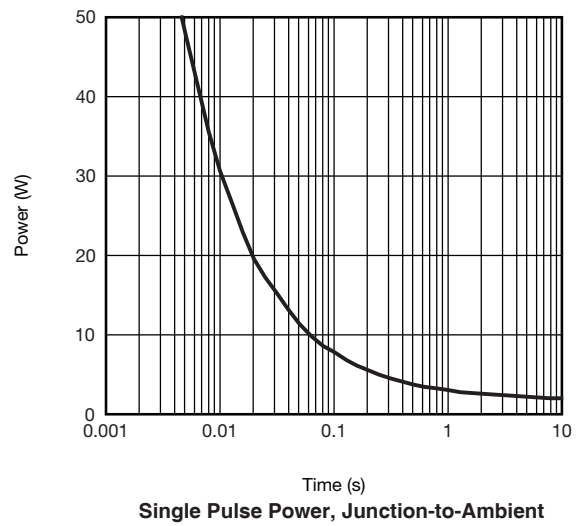
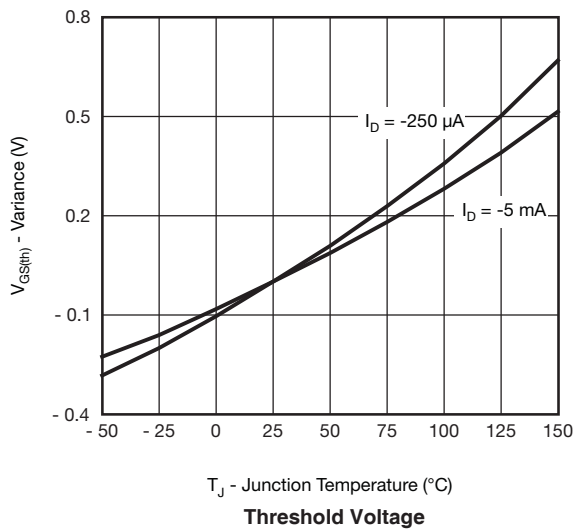
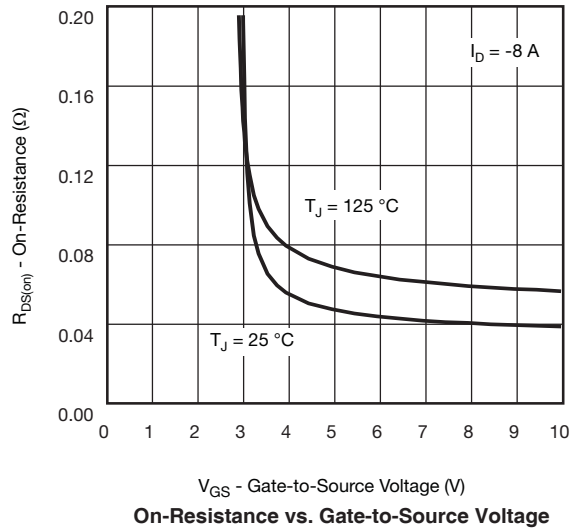
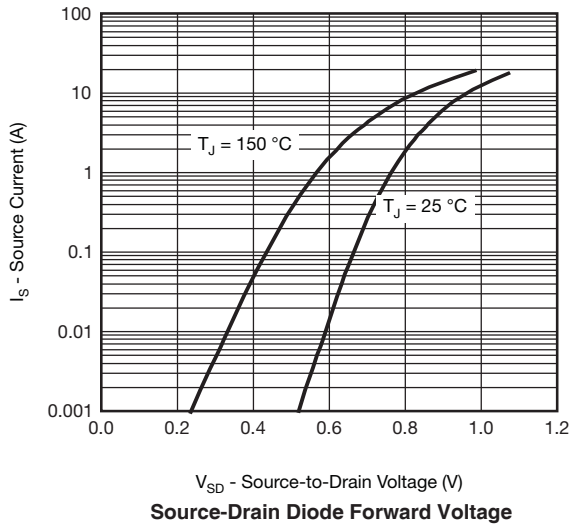


Gate Charge



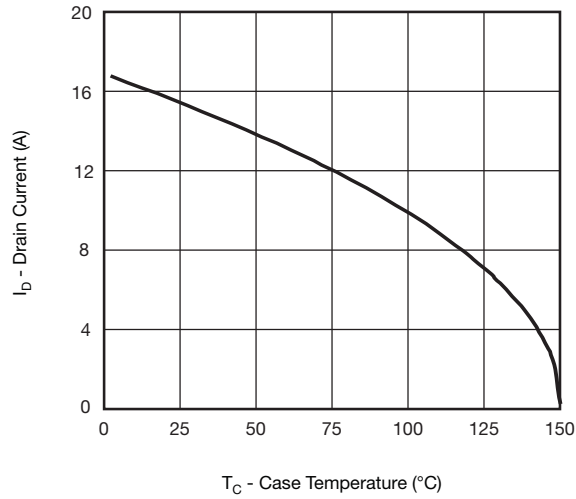
On-Resistance vs. Junction Temperature

P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



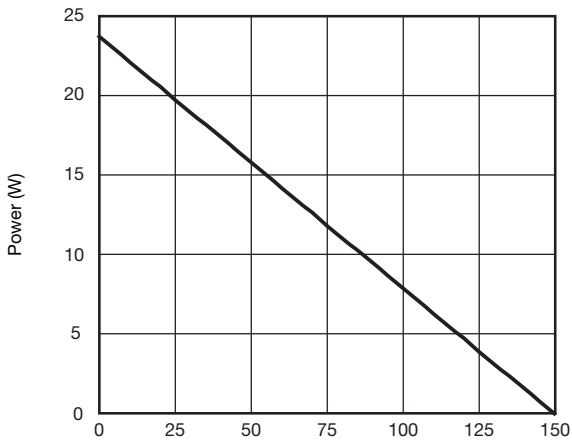
V_{DS} - Drain-to-Source Voltage (V)
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specific
Safe Operating Area, Junction-to-Ambient

P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



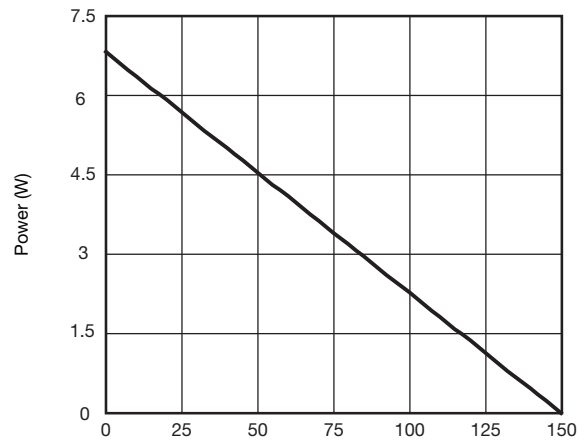
T_C - Case Temperature (°C)

Current Derating*



T_C - Case Temperature (°C)

Power Derating, Junction-to-Foot

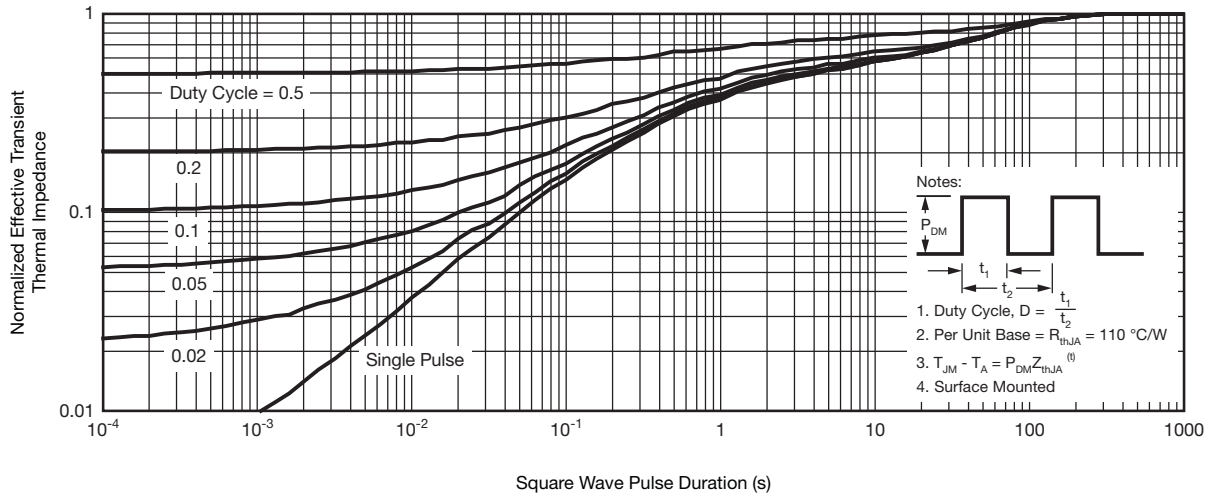


T_A - Ambient Temperature (°C)

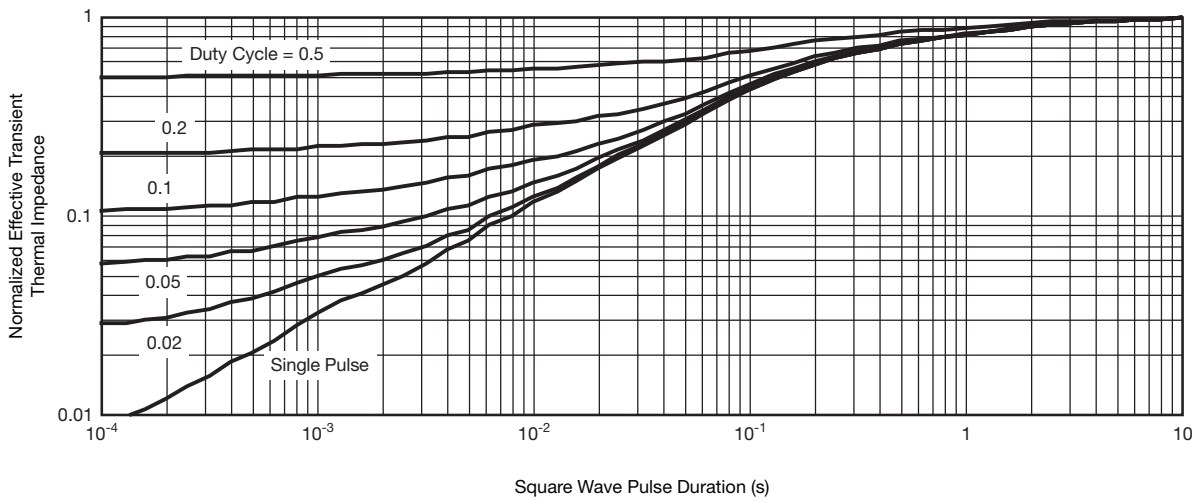
Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

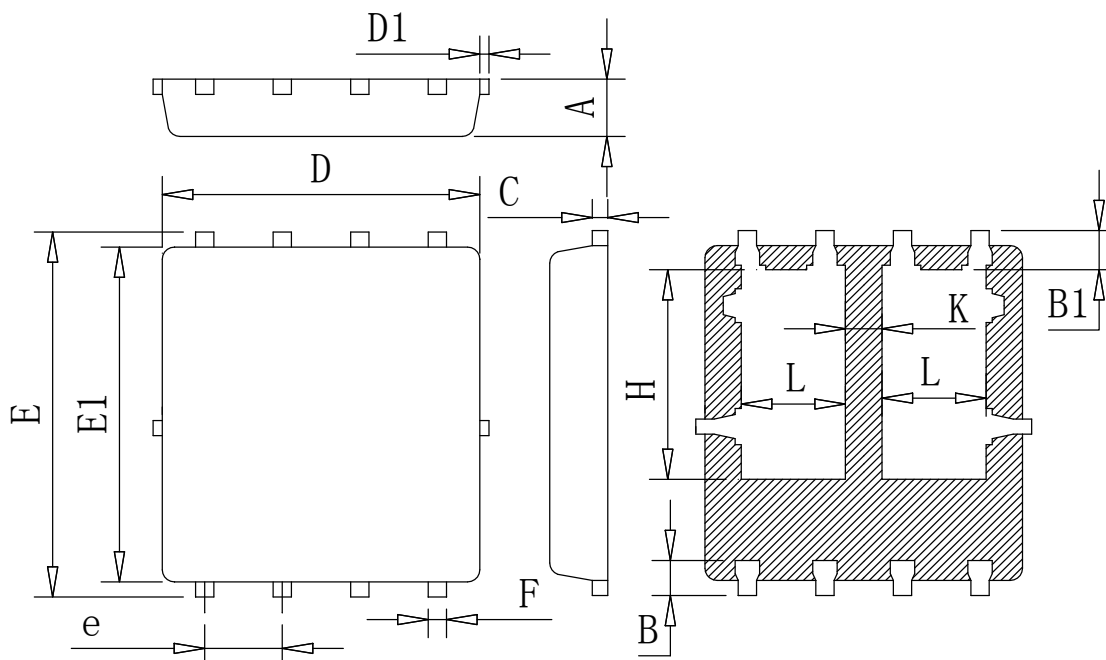


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

DFN5X6-8L-D PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

Symbol	Min	Typ	Max
A	0.85	0.95	1.05
B	0.46	0.58	0.73
B1	0.52	0.65	0.78
C	0.18	0.254	0.32
D	4.70	5.20	5.50
D1	-	-	0.18
E	5.75	6.05	6.35
E1	5.35	5.65	5.85
e	1.15	1.27	1.50
F	0.15	0.30	0.50
H	3.15	3.47	3.80
L	1.35	1.70	2.10
K	0.35	0.60	1.00

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Din-Tek Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Din-Tek documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Din-Tek Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Din-Tek documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.