

N & P-Channel 40-V (D-S) MOSFET

Key Features:

- Low $r_{DS(on)}$ trench technology
- Low thermal impedance
- Fast switching speed

Typical Applications:

- DC/DC Conversion
- Power Routing
- Motor Drives

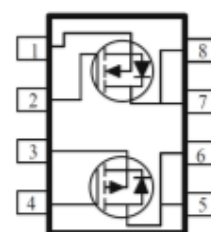
PRODUCT SUMMARY

V_{DS} (V)	$r_{DS(on)}$ (m Ω)	I_D (A)
40	36 @ $V_{GS} = 10V$	6.9
	46 @ $V_{GS} = 4.5V$	6.1
-40	39 @ $V_{GS} = -10V$	-6.6
	55 @ $V_{GS} = -4.5V$	-5.6

DFN5X6-8L



RoHS
COMPLIANT
HALOGEN
FREE



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter		Symbol	Nch Limit	Pch Limit	Units
Drain-Source Voltage		V_{DS}	40	-40	V
Gate-Source Voltage		V_{GS}	± 20	± 20	
Continuous Drain Current ^a	$T_A = 25^\circ\text{C}$	I_D	6.9	-6.6	A
	$T_A = 70^\circ\text{C}$		5.5	-5.3	
Pulsed Drain Current ^b		I_{DM}	25	-25	
Continuous Source Current (Diode Conduction) ^a		I_S	3.2	-3	A
Power Dissipation ^a	$T_A = 25^\circ\text{C}$	P_D	2.5	2.5	W
	$T_A = 70^\circ\text{C}$		1.6	1.6	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150		$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Maximum	Units
Maximum Junction-to-Ambient ^a	$t \leq 10 \text{ sec}$	$R_{\theta JA}$	50	$^\circ\text{C/W}$
	Steady State		90	

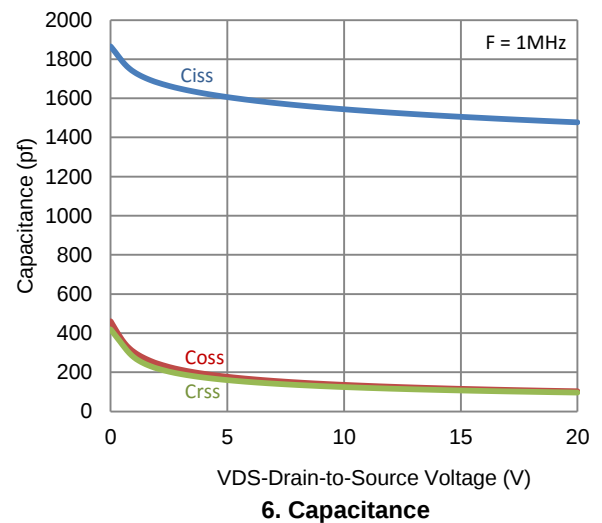
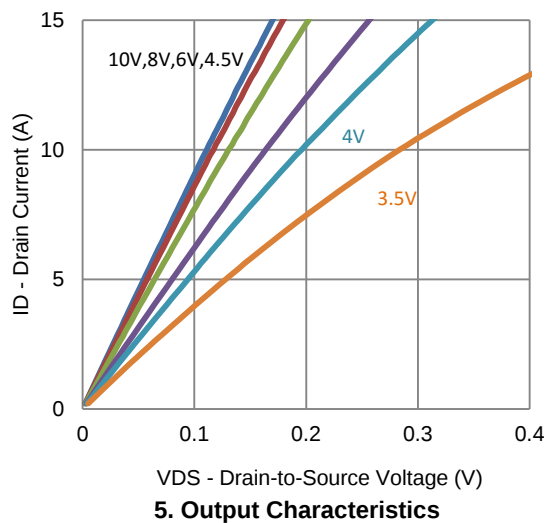
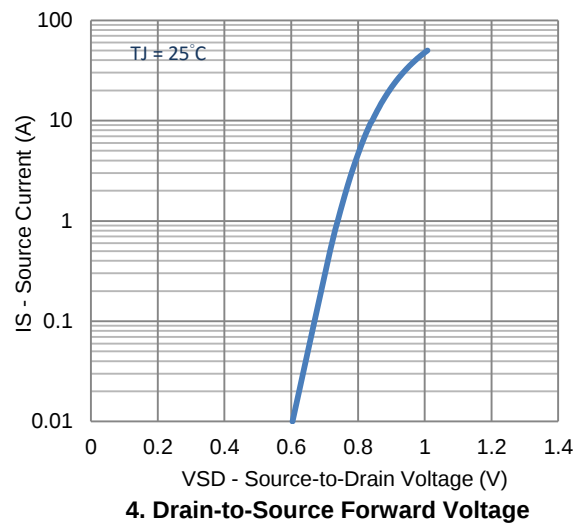
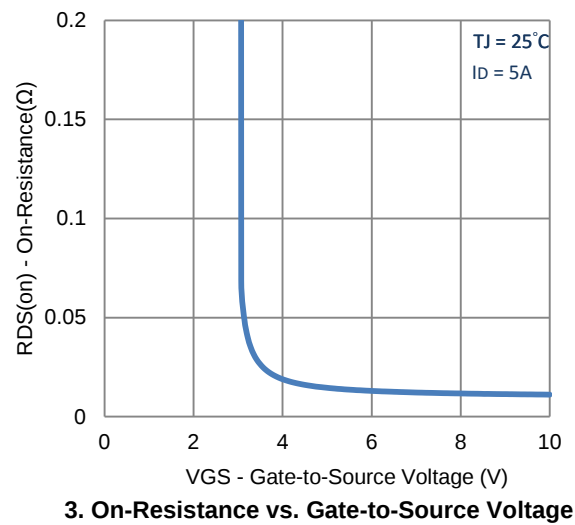
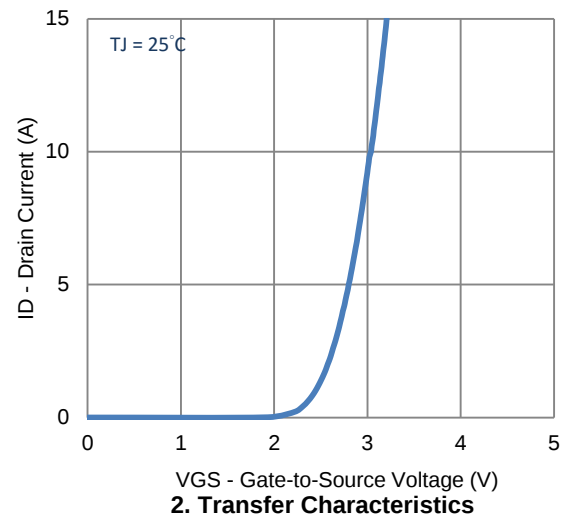
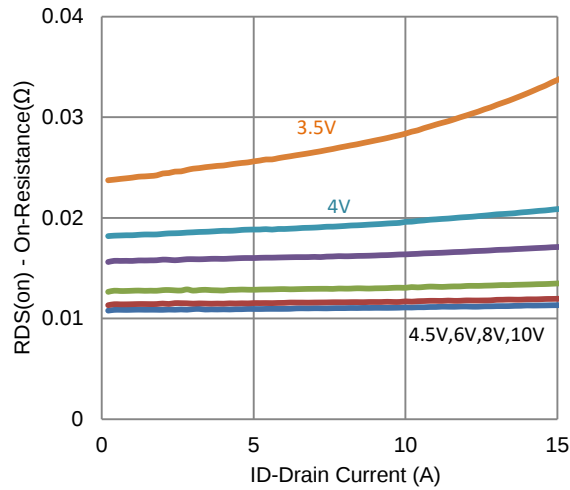
Notes

- Surface Mounted on 1" x 1" FR4 Board.
- Pulse width limited by maximum junction temperature

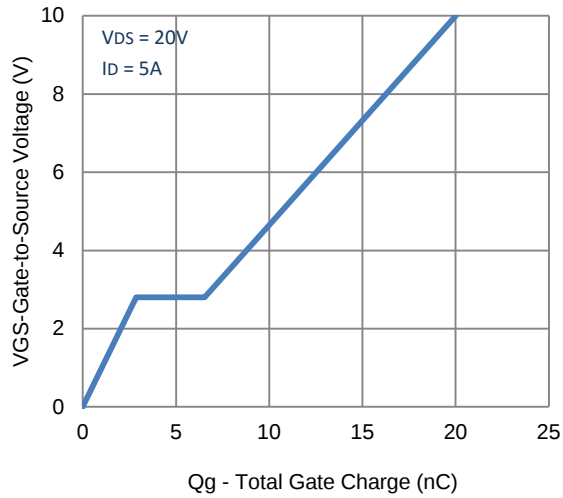
Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$ (Nch)	1			V
		$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$ (Pch)	-1			V
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}	$V_{DS} = 32\text{ V}$, $V_{GS} = 0\text{ V}$ (Nch)			1	μA
		$V_{DS} = -32\text{ V}$, $V_{GS} = 0\text{ V}$ (Pch)			-1	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = 5\text{ V}$, $V_{GS} = 0\text{ V}$ (Nch)	7.9			A
		$V_{DS} = -5\text{ V}$, $V_{GS} = 0\text{ V}$ (Pch)	-7.5			A
Drain-Source On-Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 5\text{ A}$ (Nch)			36	m Ω
		$V_{GS} = 4.5\text{ V}$, $I_D = 4\text{ A}$ (Nch)			46	
		$V_{GS} = -10\text{ V}$, $I_D = -4.8\text{ A}$ (Pch)			39	m Ω
		$V_{GS} = -4.5\text{ V}$, $I_D = -3.9\text{ A}$ (Pch)			55	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 6\text{ A}$ (Nch)		18		S
		$V_{DS} = -15\text{ V}$, $I_D = -5\text{ A}$ (Pch)		12		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 1.6\text{ A}$, $V_{GS} = 0\text{ V}$ (Nch)		0.75		V
		$I_S = -1.5\text{ A}$, $V_{GS} = 0\text{ V}$ (Pch)		-0.81		V
Dynamic ^b						
Total Gate Charge	Q_g	N - Channel $V_{DS} = 20\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 5\text{ A}$		10		nC
Gate-Source Charge	Q_{gs}			2.9		
Gate-Drain Charge	Q_{gd}			3.7		
Turn-On Delay Time	$t_{d(on)}$	N - Channel $V_{DS} = 20\text{ V}$, $R_L = 4\text{ }\Omega$, $I_D = 5\text{ A}$, $V_{GEN} = 0\text{ V}$, $R_{GEN} = 6\text{ }\Omega$		8		ns
Rise Time	t_r			5		
Turn-Off Delay Time	$t_{d(off)}$			33		
Fall Time	t_f			8		
Input Capacitance	C_{iss}	N - Channel $V_{DS} = 15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ Mhz}$		1506		pF
Output Capacitance	C_{oss}			116		
Reverse Transfer Capacitance	C_{rss}			107		
Total Gate Charge	Q_g	P - Channel $V_{DS} = -20\text{ V}$, $V_{GS} = -4.5\text{ V}$, $I_D = -4.8\text{ A}$		15		nC
Gate-Source Charge	Q_{gs}			4.8		
Gate-Drain Charge	Q_{gd}			5.6		
Turn-On Delay Time	$t_{d(on)}$	P - Channel $V_{DS} = -20\text{ V}$, $R_L = 4.2\text{ }\Omega$, $I_D = -4.8\text{ A}$, $V_{GEN} = 0\text{ V}$, $R_{GEN} = 6\text{ }\Omega$		6		ns
	t_r			5		
Turn-Off Delay Time	$t_{d(off)}$			44		
Fall Time	t_f			16		
Input Capacitance	C_{iss}	P - Channel $V_{DS} = -15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ Mhz}$		1264		pF
Output Capacitance	C_{oss}			110		
Reverse Transfer Capacitance	C_{rss}			84		

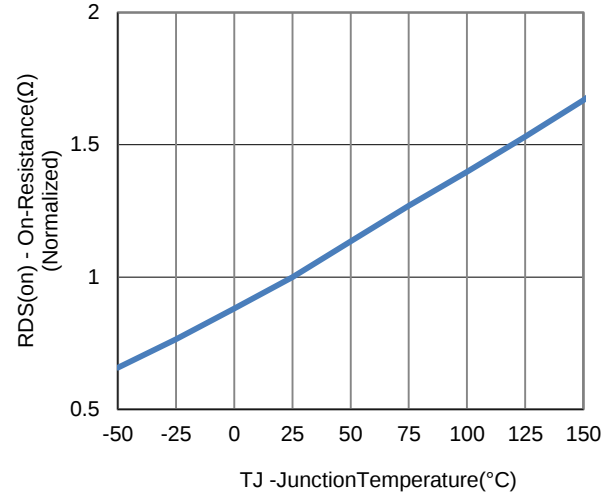
Typical Electrical Characteristics - N-channel



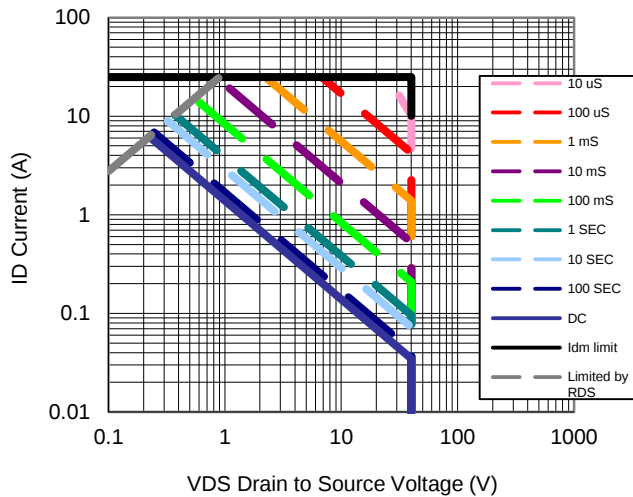
Typical Electrical Characteristics - N-channel



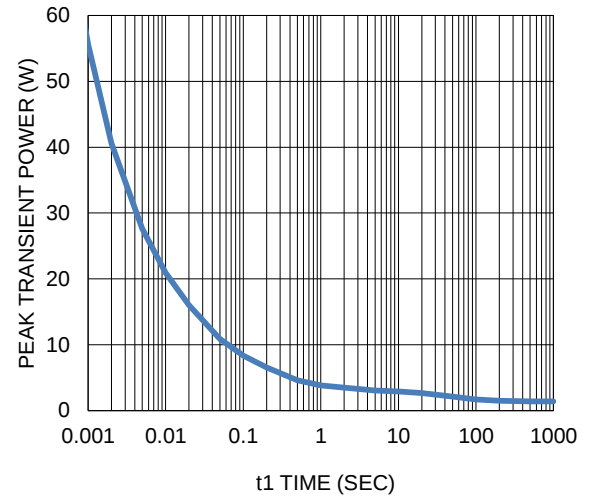
7. Gate Charge



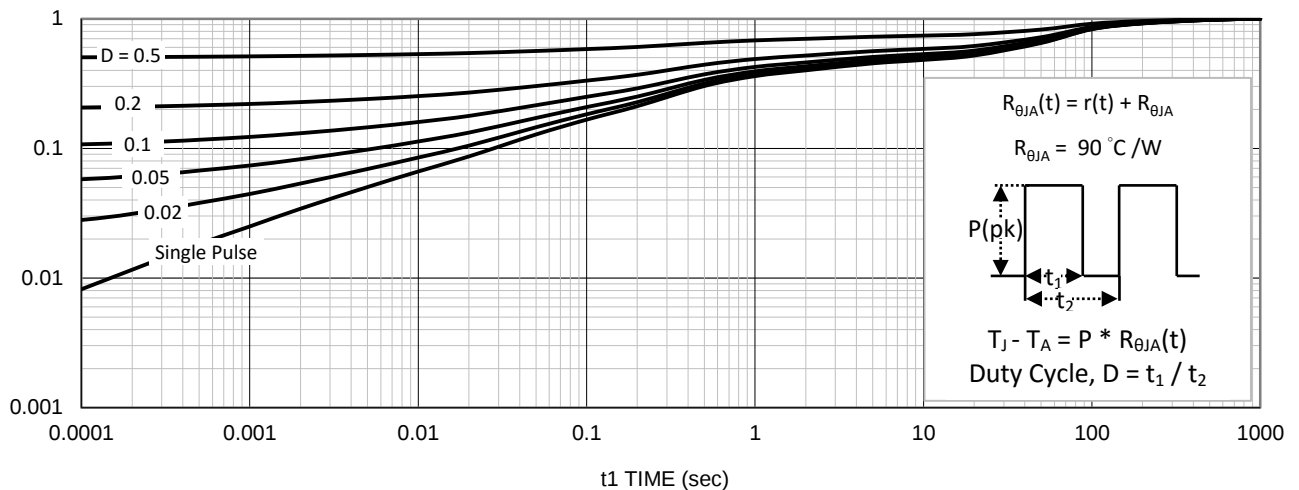
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

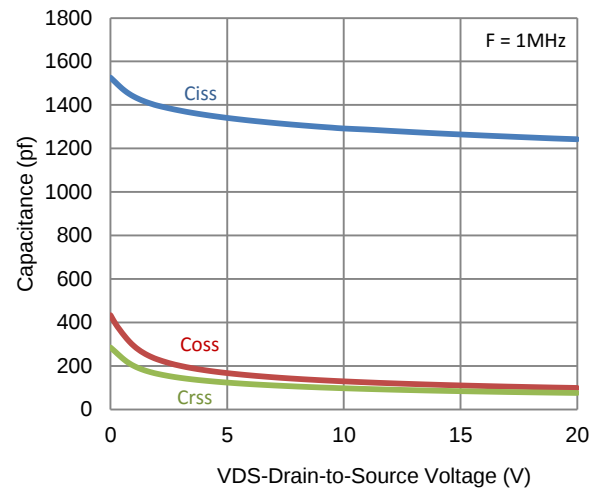
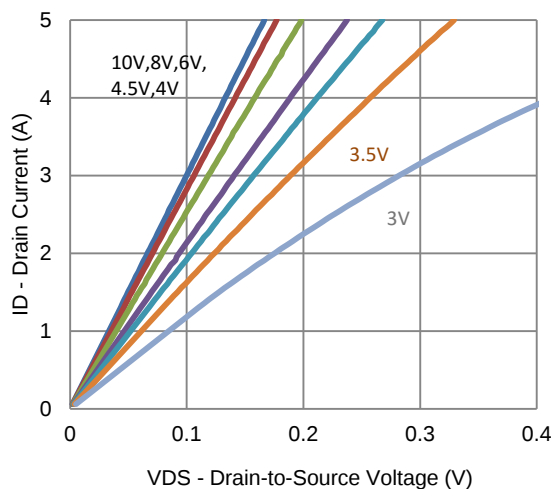
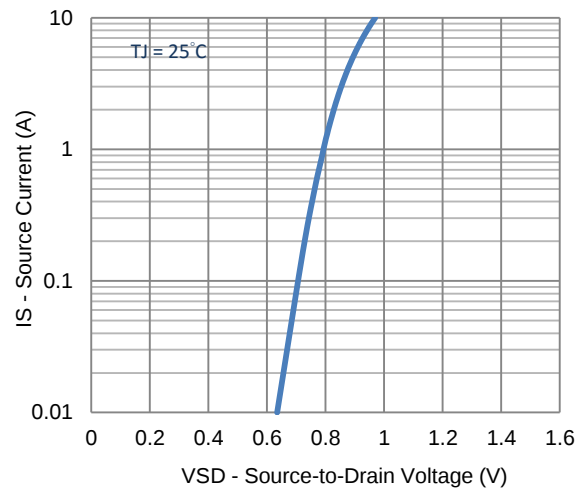
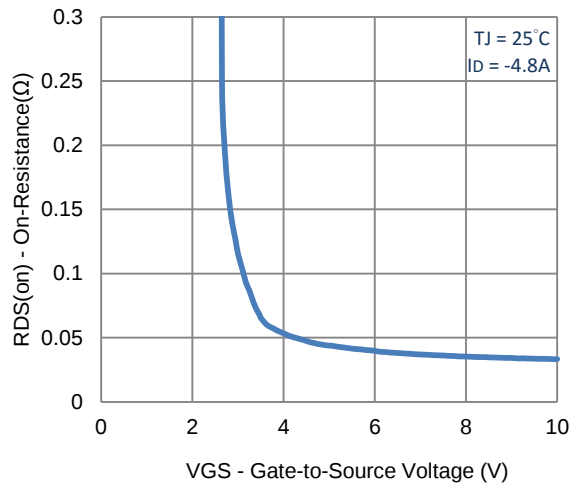
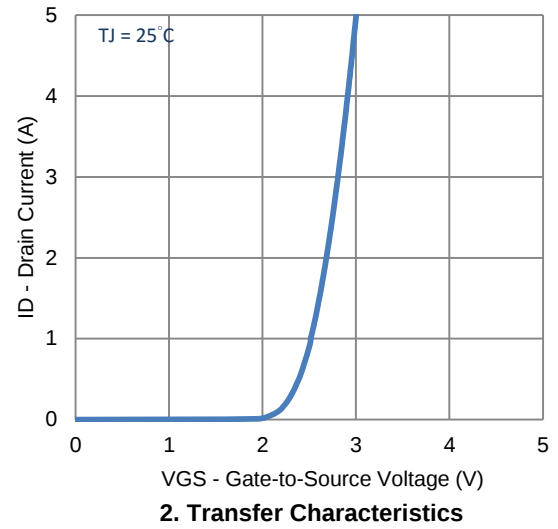
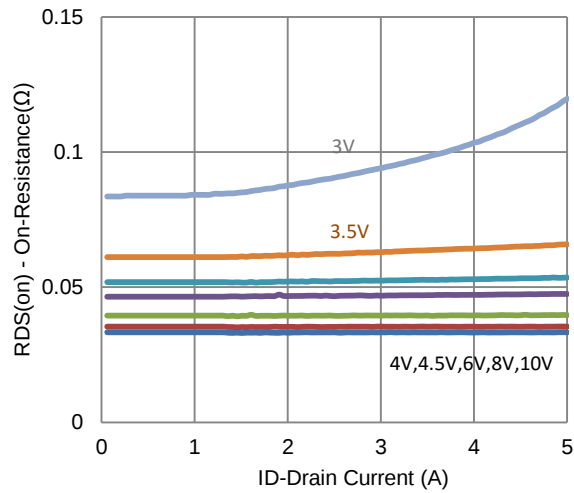


10. Single Pulse Maximum Power Dissipation

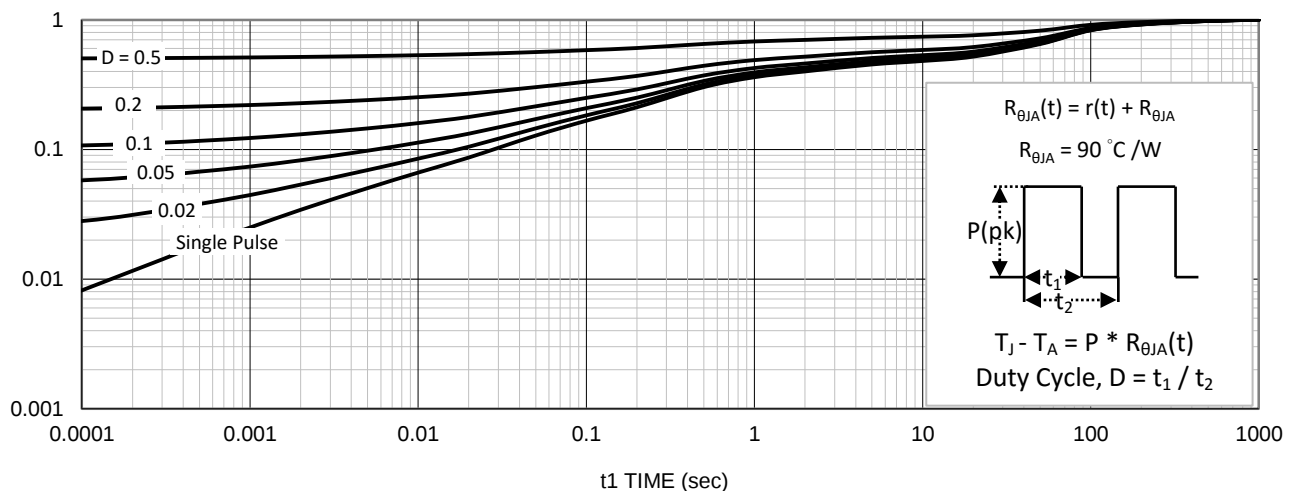
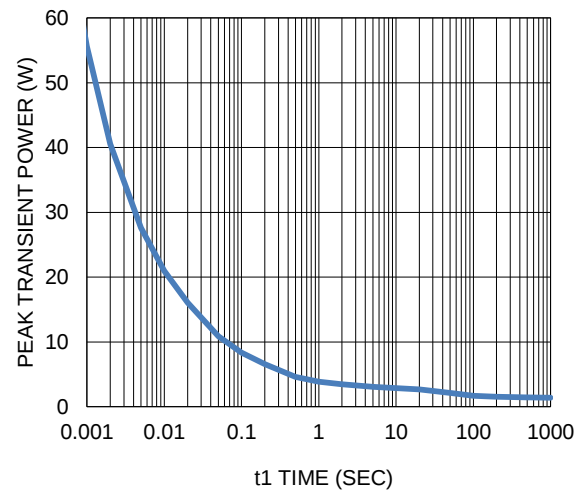
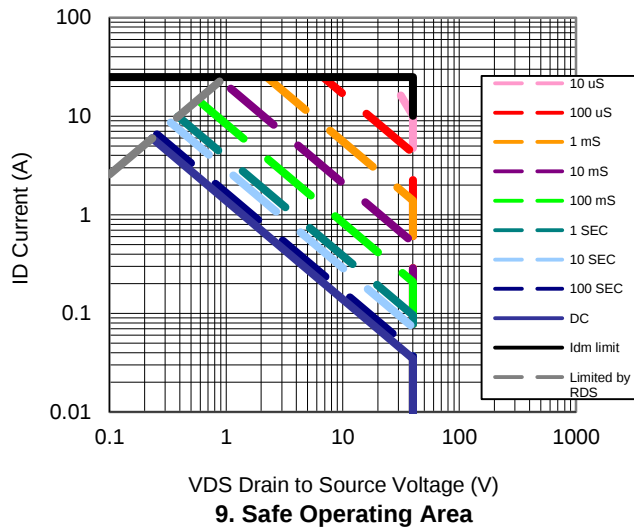
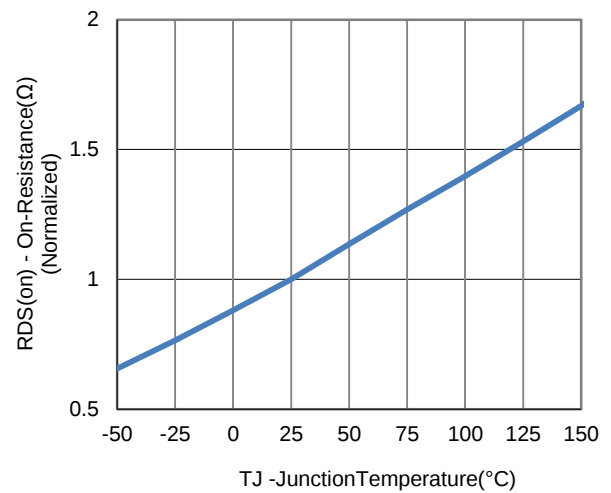
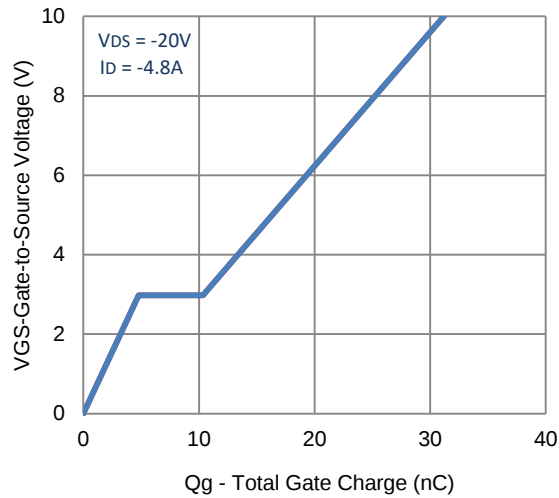


11. Normalized Thermal Transient Junction to Ambient

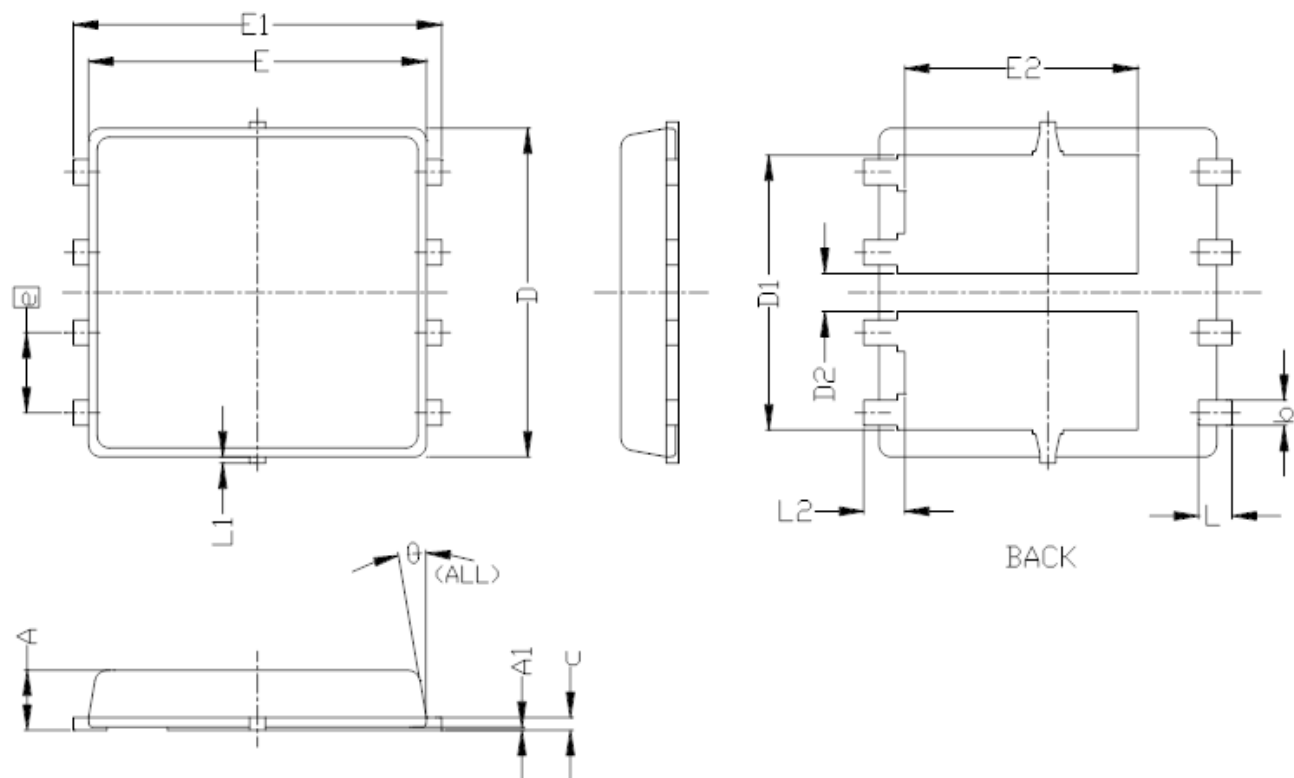
Typical Electrical Characteristics - P-channel



Typical Electrical Characteristics - P-channel



Package Information



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.85	0.95	1.00	0.033	0.037	0.039
A1	0.00	—	0.05	0.000	—	0.002
b	0.30	0.40	0.50	0.012	0.016	0.020
c	0.15	0.20	0.25	0.006	0.008	0.010
D	5.20 BSC			0.205 BSC		
D1	4.35 BSC			0.171 BSC		
E	5.55 BSC			0.219 BSC		
E1	6.05 BSC			0.238 BSC		
E2	3.62 BSC			0.143 BSC		
e	1.27 BSC			0.050 BSC		
L	0.45	0.55	0.65	0.018	0.022	0.026
L1	0	—	0.15	0	—	0.006
L2	0.68 REF			0.027 REF		
θ	0°	—	10°	0°	—	10°