N-Channel, Reduced Q_g, MOSFET with Schottky Diode

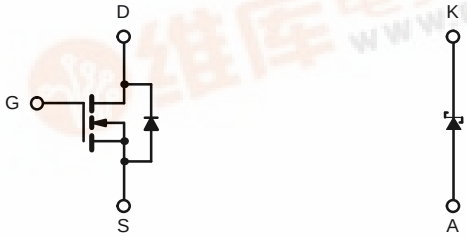
LITTLE FOOT Plus™

MOSFET PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
20	0.160 @ V_{GS} = 4.5 V	±1.9
	0.260 @ V_{GS} = 3.0 V	±1.5

SCHOTTKY PRODUCT SUMMARY		
V_{KA} (V)	V_F (v) Diode Forward Voltage	I_F (A)
20	0.5 V @ 1 A	1.5

TSSOP-8

Top View



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage (MOSFET)		V_{DS}	20	V
Reverse Voltage (Schottky)		V_{KA}	20	
Gate-Source Voltage (MOSFET)		V_{GS}	±12	
Continuous Drain Current (T_J = 150°C) (MOSFET)[a, b]	T_A = 25°C	I_D	±1.9	A
	T_A = 70°C		±1.5	
Pulsed Drain Current (MOSFET)		I_{DM}	±8	
Continuous Source Current (MOSFET Diode Conduction)[a, b]		I_S	1.0	
Average Foward Current (Schottky)		I_F	1.5	
Pulsed Foward Current (Schottky)		I_{FM}	30	
Maximum Power Dissipation (MOSFET)[a, b]	T_A = 25°C	P_D	1.2	W
	T_A = 70°C		0.76	
Maximum Power Dissipation (Schottky)[a, b]	T_A = 25°C		1.0	
	T_A = 70°C		0.64	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	–55 to 150	°C

THERMAL RESISTANCE RATINGS					
Parameter	Device	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient (t ≤ 10 sec)[a]	MOSFET	R_{thJA}		105	°C/W
	Schottky			125	
Maximum Junction-to-Ambient (t = steady state)[a]	MOSFET		115		
	Schottky		130		

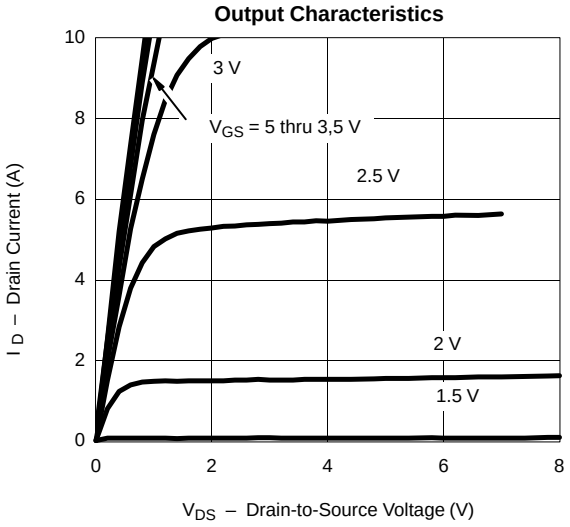
Notes
a. Surface Mounted on FR4 Board.
b. t ≤ 10 sec.

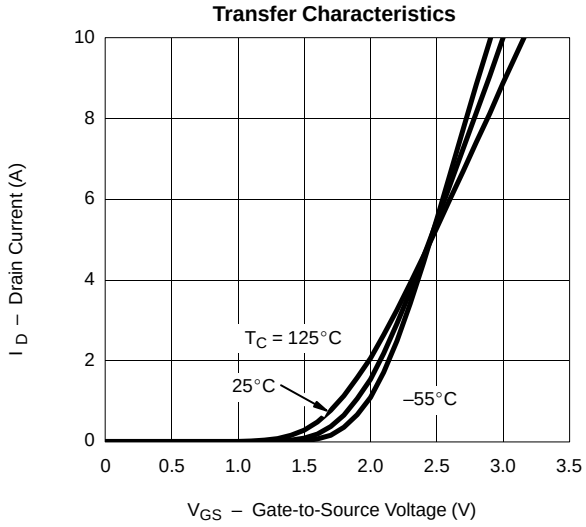
MOSFET SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)						
Parameter	**Symbol**	**Test Condition**	**Min**	**Typ**	**Max**	**Unit**
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250$ μA	0.6			V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = \pm 12$ V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20$ V, $V_{GS} = 0$ V			1	μA
		$V_{DS} = 20$ V, $V_{GS} = 0$ V, $T_J = 55°C$			25	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq 5$ V, $V_{GS} = 4.5$ V	6			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	$V_{GS} = 4.5$ V, $I_D = 1.9$ A		0.085	0.160	Ω
		$V_{GS} = 3.0$ V, $I_D = 1.5$ A		0.115	0.260	
Forward Transconductance[a]	g_{fs}	$V_{DS} = 15$ V, $I_D = 1.9$ A		5		S
Diode Forward Voltage[a]	V_{SD}	$I_S = 1.0$ A, $V_{GS} = 0$ V		0.77	1.2	V
Dynamic[b]						
Total Gate Charge	Q_g	$V_{DS} = 3.5$ V, $V_{GS} = 4.5$ V, $I_D = 0.3$ A		2.1	3.5	nC
Gate-Source Charge	Q_{gs}			0.43		
Gate-Drain Charge	Q_{gd}			0.30		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 3.5$ V, $R_L = 11.5$ Ω $I_D \cong 0.3$ A, $V_{GEN} = 4.5$ V, $R_G = 6$ Ω		8	20	ns
Rise Time	t_r			10	20	
Turn-Off Delay Time	$t_{d(off)}$			12	25	
Fall Time	t_f			6	15	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 1.0$ A, di/dt = 100 A/μs		31	60	

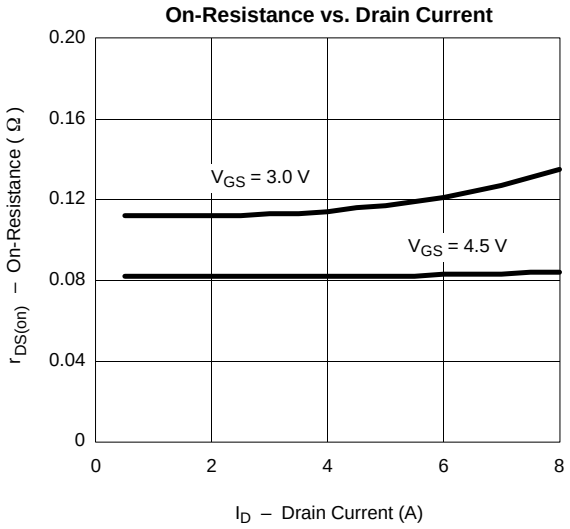
Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.

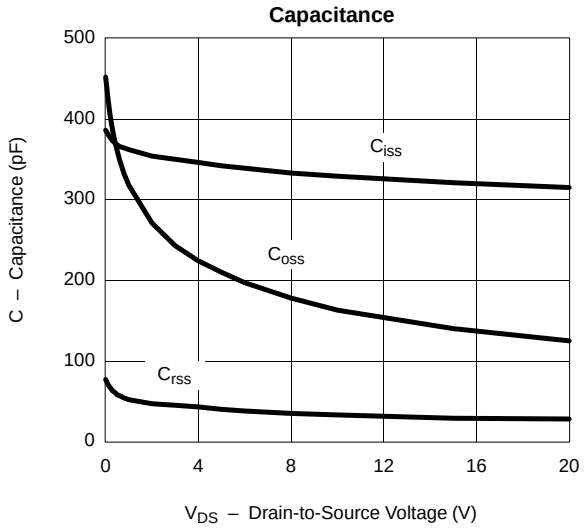
SCHOTTKY SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)						
Parameter	**Symbol**	**Test Condition**	**Min**	**Typ**	**Max**	**Unit**
Forward Voltage Drop	V_F	$I_F = 1$ A		0.45	0.50	V
		$I_F = 1$ A, $T_J = 125°C$		0.36	0.42	
Maximum Reverse Leakage Current	I_{rm}	$V_r = 20$ V		0.003	0.100	mA
		$V_r = 20$ V, $T_J = 75°C$		0.1	1	
		$V_r = 20$ V, $T_J = 125°C$		2	10	
Junction Capacitance	C_T	$V_r = 10$ V		62		pF

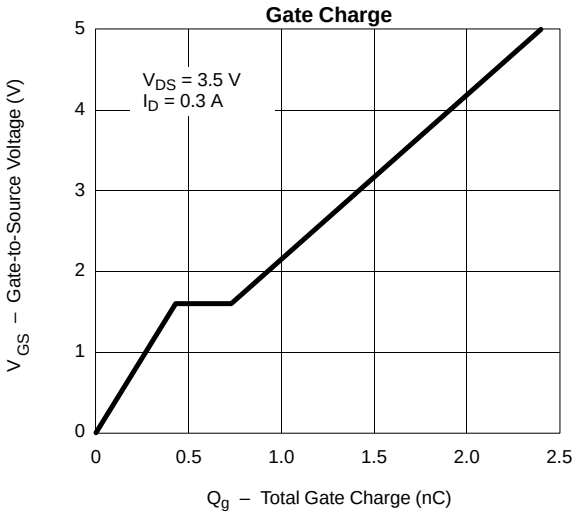
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) MOSFET

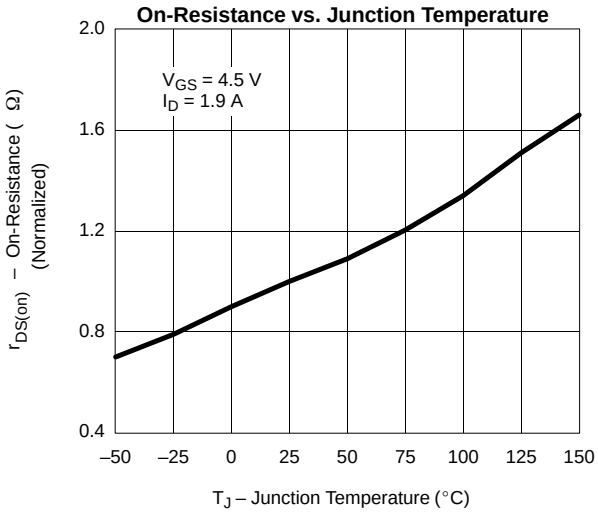






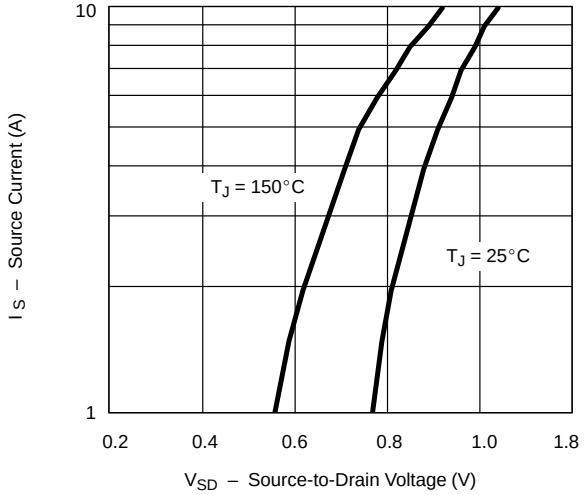




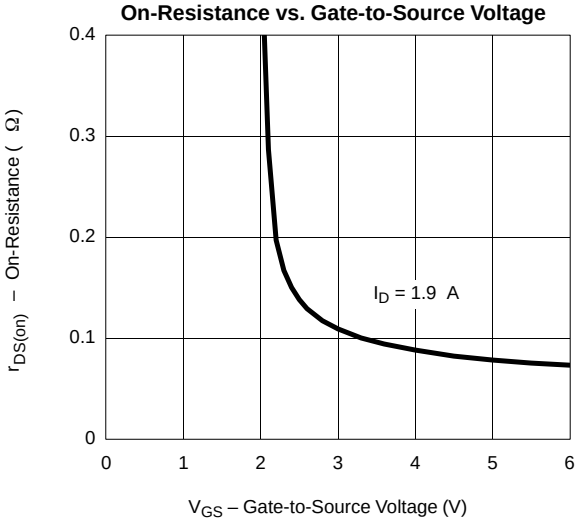


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) MOSFET

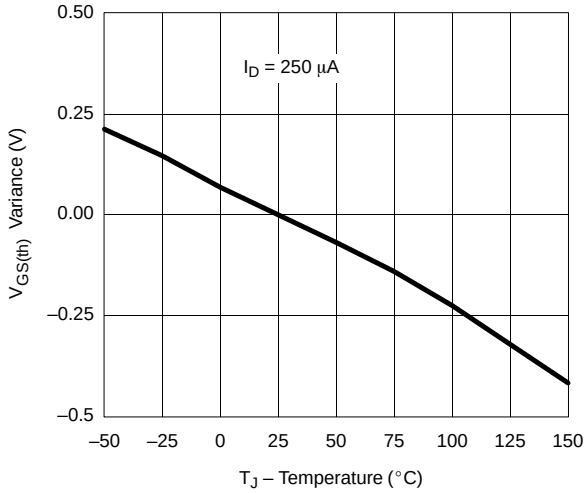
Source-Drain Diode Forward Voltage



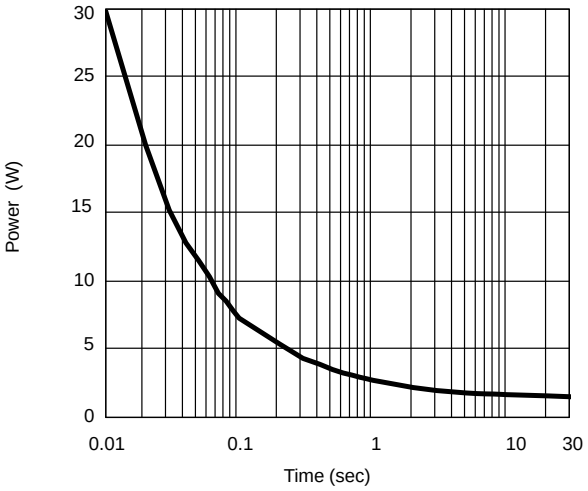
On-Resistance vs. Gate-to-Source Voltage



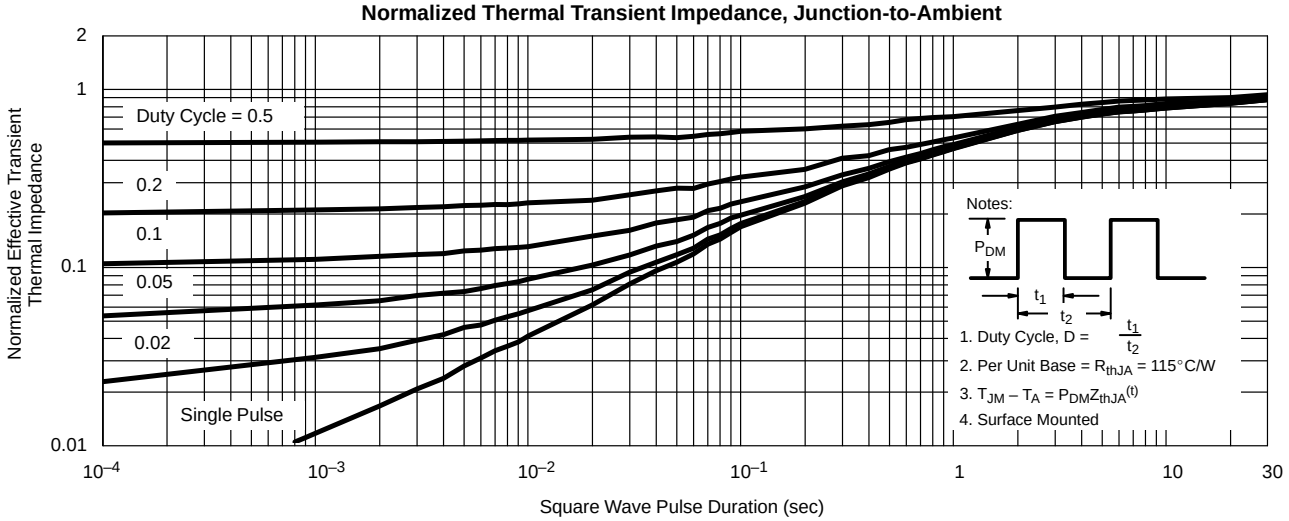
Threshold Voltage



Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Ambient



TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) SCHOTTKY