

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

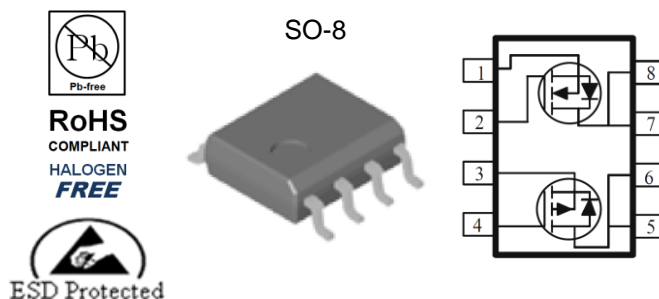
Key Features:

- 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	42 @ $V_{GS} = 10V$	5.8
	60 @ $V_{GS} = 4.5V$	4.8
-40	98 @ $V_{GS} = -10V$	-3.8
	135 @ $V_{GS} = -4.5V$	-3.2



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$ 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	$T_A = 25^\circ C$	I_D	5.8	-3.8	A
	$T_A = 70^\circ C$		4.5	-3.0	
Pulsed Drain Current ^b		I_{DM}	15	-15	
Continuous Source Current (Diode Conduction) ^a		I_S	2.6	-2.4	A
Power Dissipation ^a	$T_A = 25^\circ C$	P_D	2.1	2.1	W
	$T_A = 70^\circ C$		1.3	1.3	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150		$^\circ C$

THERMAL RESISTANCE RATINGS				
Parameter		Symbol	Maximum	Units
Maximum Junction-to-Ambient ^a	$t \leq 10$ sec	$R_{\theta JA}$	62.5	$^\circ C/W$
	Steady State		110	

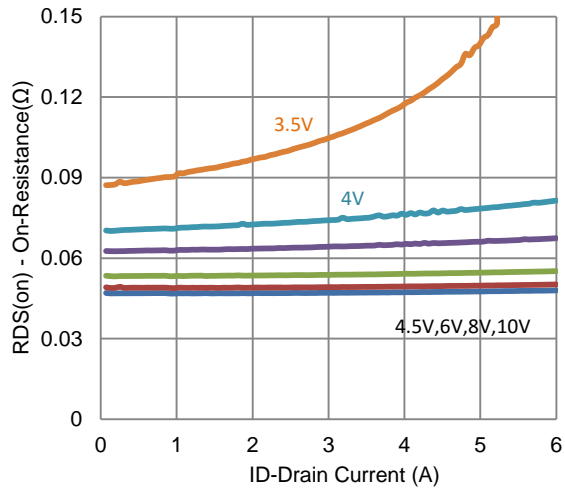
Notes

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

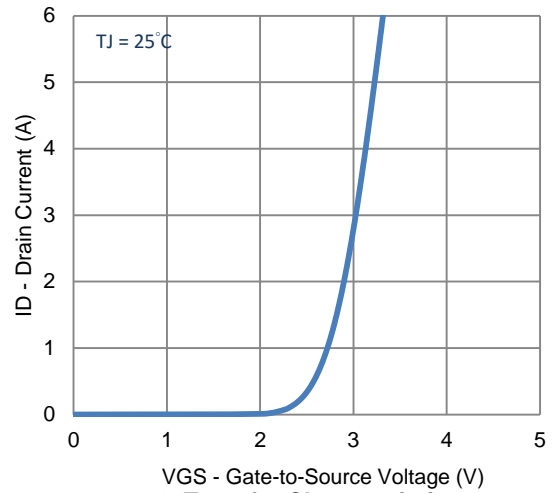
Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \mu A$ (Nch)	1			V
		$V_{DS} = V_{GS}, I_D = -250 \mu A$ (Pch)	-1			V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0 V, V_{GS} = \pm 20 V$			± 10	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 32 V, V_{GS} = 0 V$ (Nch)			1	μA
		$V_{DS} = -32 V, V_{GS} = 0 V$ (Pch)			-1	μA
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = 5 V, V_{GS} = 10 V$ (Nch)	8			A
		$V_{DS} = -5 V, V_{GS} = -10 V$ (Pch)	-6			A
Drain-Source On-Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10 V, I_D = 2.9 A$ (Nch)			42	$m\Omega$
		$V_{GS} = 4.5 V, I_D = 2.4 A$ (Nch)			60	$m\Omega$
		$V_{GS} = -10 V, I_D = -1.9 A$ (Pch)			98	$m\Omega$
		$V_{GS} = -4.5 V, I_D = -1.6 A$ (Pch)			135	$m\Omega$
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15 V, I_D = 2.9 A$ (Nch)		11		S
		$V_{DS} = -15 V, I_D = -1.9 A$ (Pch)		6		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 1.3 A, V_{GS} = 0 V$ (Nch)		0.8		V
		$I_S = -1.2 A, V_{GS} = 0 V$ (Pch)		-0.84		V
Dynamic ^b						
Total Gate Charge	Q_g	N - Channel $V_{DS} = 20 V, V_{GS} = 4.5 V,$ $I_D = 2.9 A$		3.7		nC
Gate-Source Charge	Q_{gs}			1.0		
Gate-Drain Charge	Q_{gd}			1.6		
Turn-On Delay Time	$t_{d(on)}$	N - Channel $V_{DS} = 20 V, R_L = 6.9 \Omega,$ $I_D = 2.9 A,$ $V_{GEN} = 10 V, R_{GEN} = 6 \Omega$		5		ns
Rise Time	t_r			5		
Turn-Off Delay Time	$t_{d(off)}$			20		
Fall Time	t_f			6		
Input Capacitance	C_{iss}	N - Channel $V_{DS} = 15 V, V_{GS} = 0 V, f = 1 Mhz$		324		pF
Output Capacitance	C_{oss}			43		
Reverse Transfer Capacitance	C_{rss}			34		
Total Gate Charge	Q_g	P - Channel $V_{DS} = -20 V, V_{GS} = -4.5 V,$ $I_D = -1.9 A$		6.0		nC
Gate-Source Charge	Q_{gs}			1.3		
Gate-Drain Charge	Q_{gd}			2.5		
Turn-On Delay Time	$t_{d(on)}$	P - Channel $V_{DS} = -20 V, R_L = 10.5 \Omega,$ $I_D = -1.9 A,$ $V_{GEN} = -10 V, R_{GEN} = 6 \Omega$		6		ns
Rise Time	t_r			6		
Turn-Off Delay Time	$t_{d(off)}$			26		
Fall Time	t_f			12		
Input Capacitance	C_{iss}	P - Channel $V_{DS} = -15 V, V_{GS} = 0 V, f = 1 Mhz$		384		pF
Output Capacitance	C_{oss}			51		
Reverse Transfer Capacitance	C_{rss}			44		

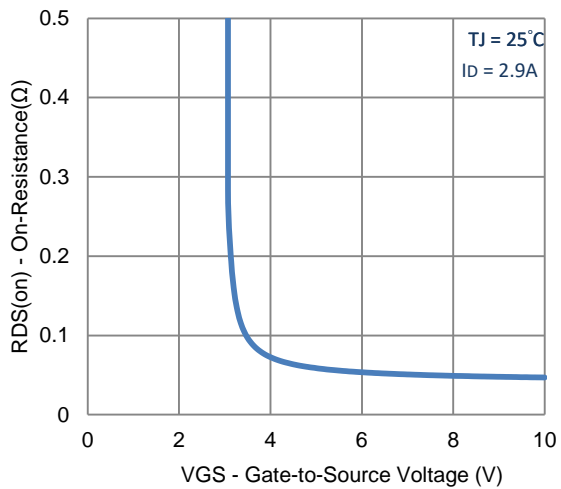
Typical Electrical Characteristics - N-channel



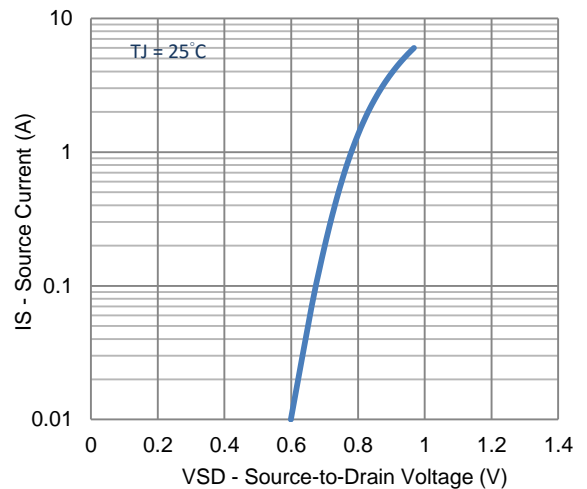
1. On-Resistance vs. Drain Current



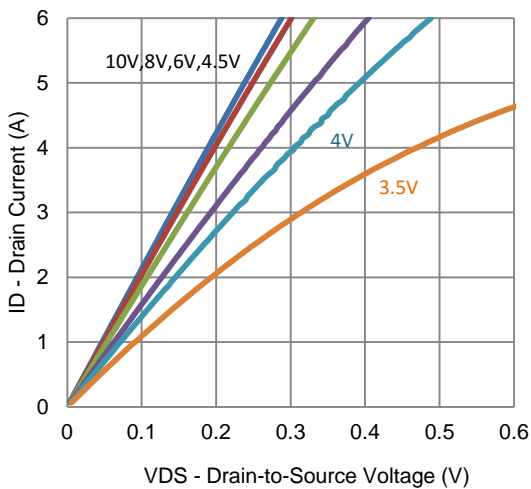
2. Transfer Characteristics



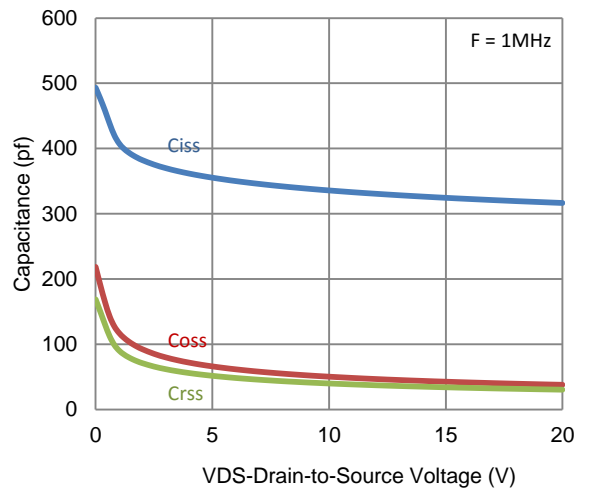
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

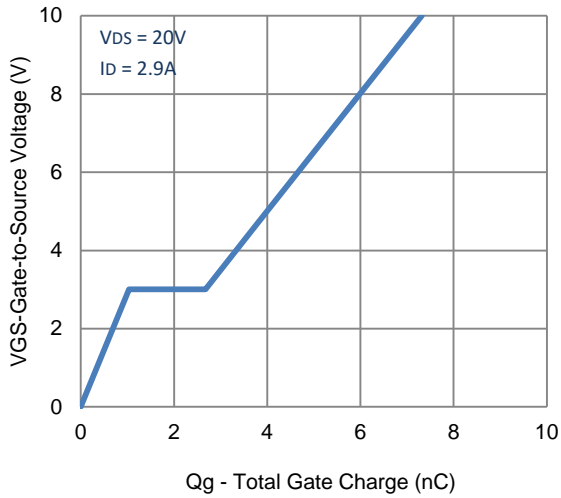


5. Output Characteristics

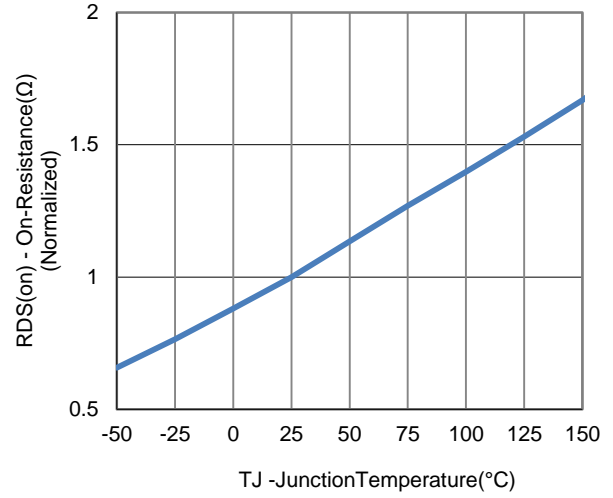


6. Capacitance

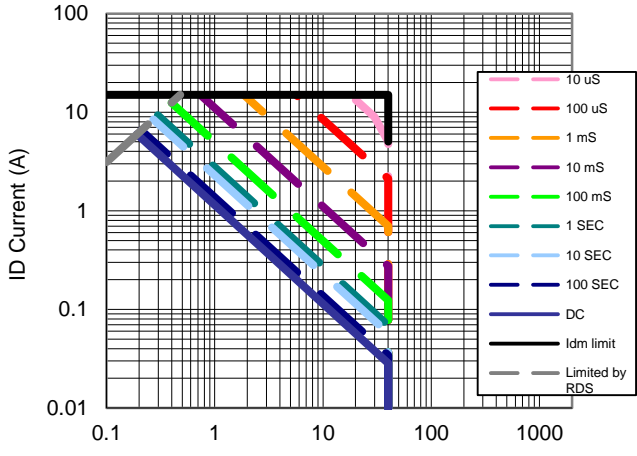
Typical Electrical Characteristics - N-channel



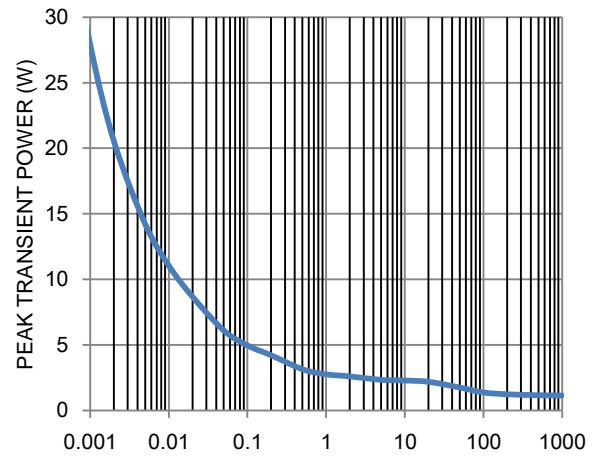
7. Gate Charge



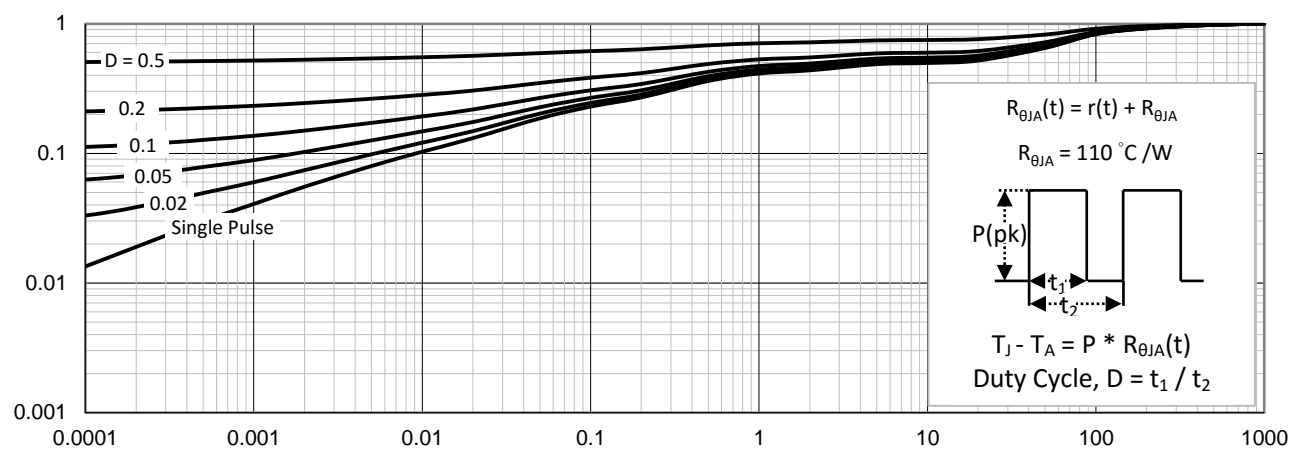
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

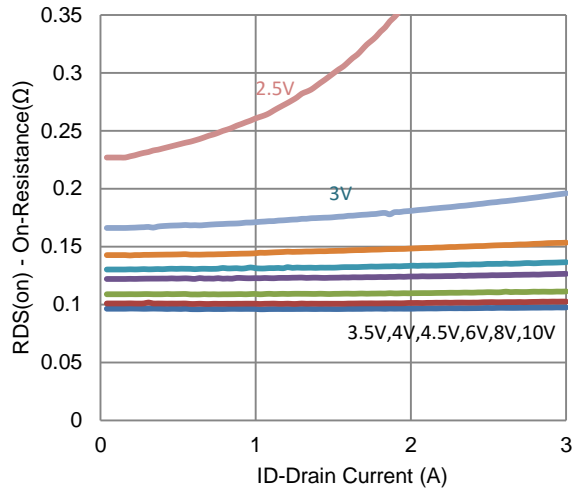


10. Single Pulse Maximum Power Dissipation

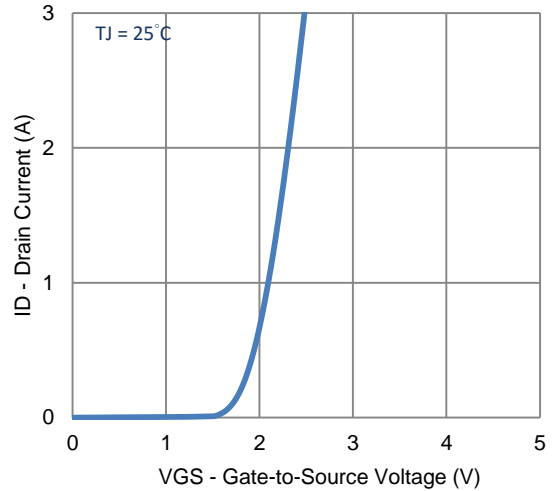


11. Normalized Thermal Transient Junction to Ambient

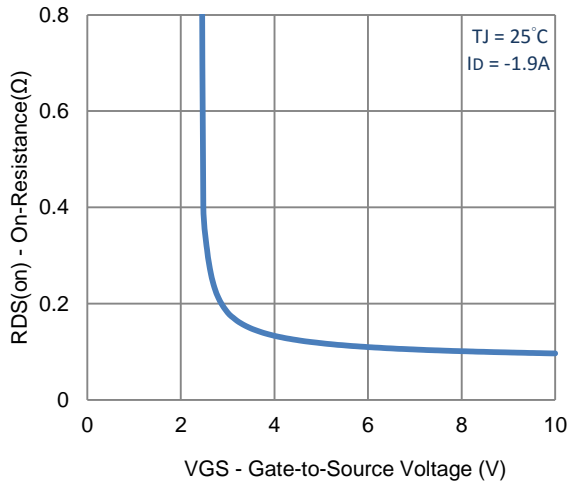
Typical Electrical Characteristics - P-channel



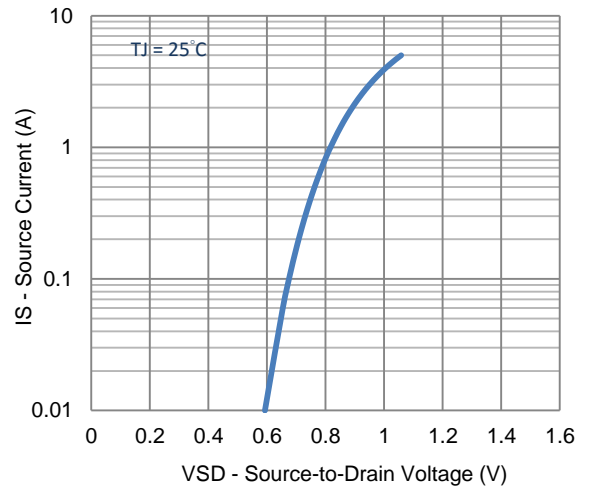
1. On-Resistance vs. Drain Current



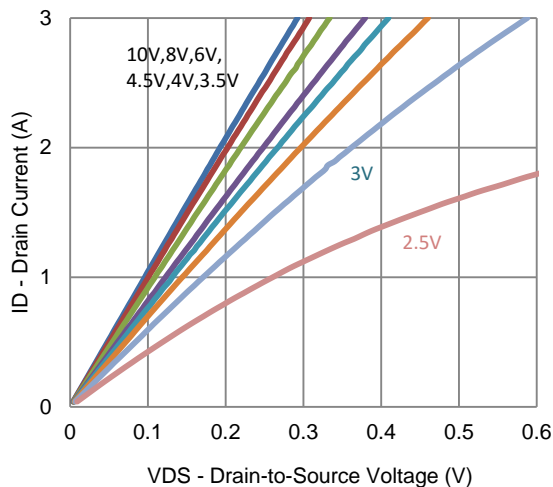
2. Transfer Characteristics



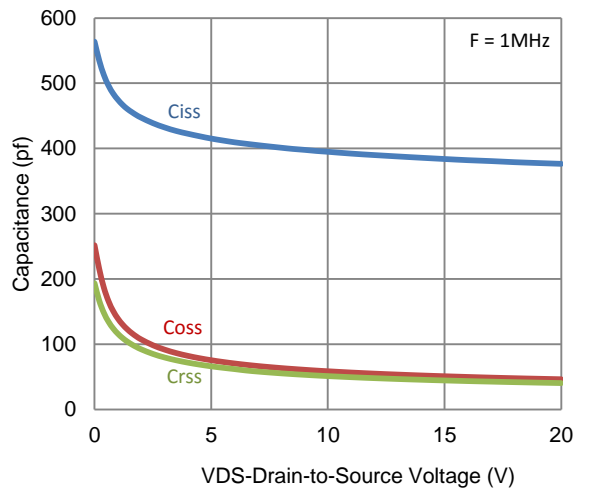
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

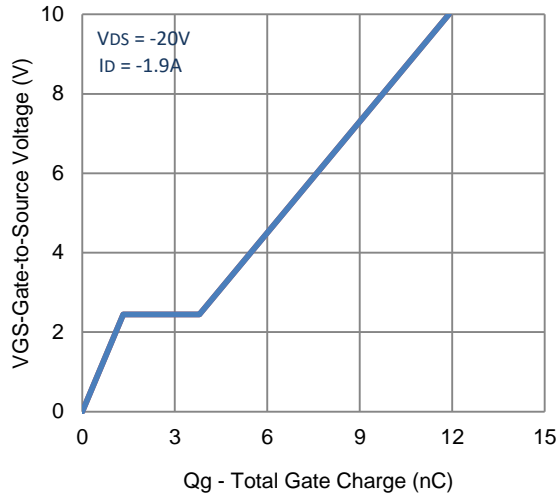


5. Output Characteristics

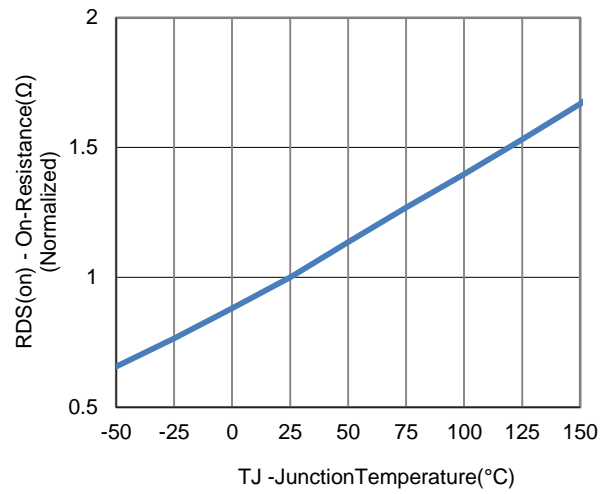


6. Capacitance

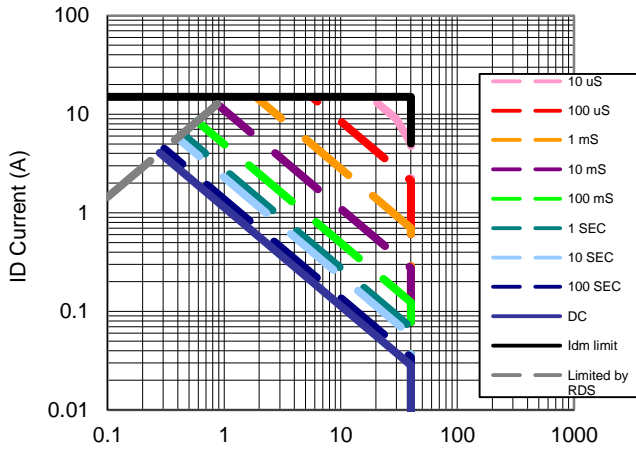
Typical Electrical Characteristics - P-channel



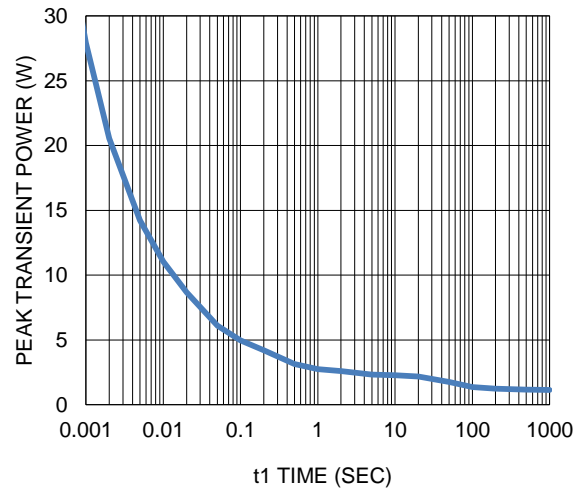
7. Gate Charge



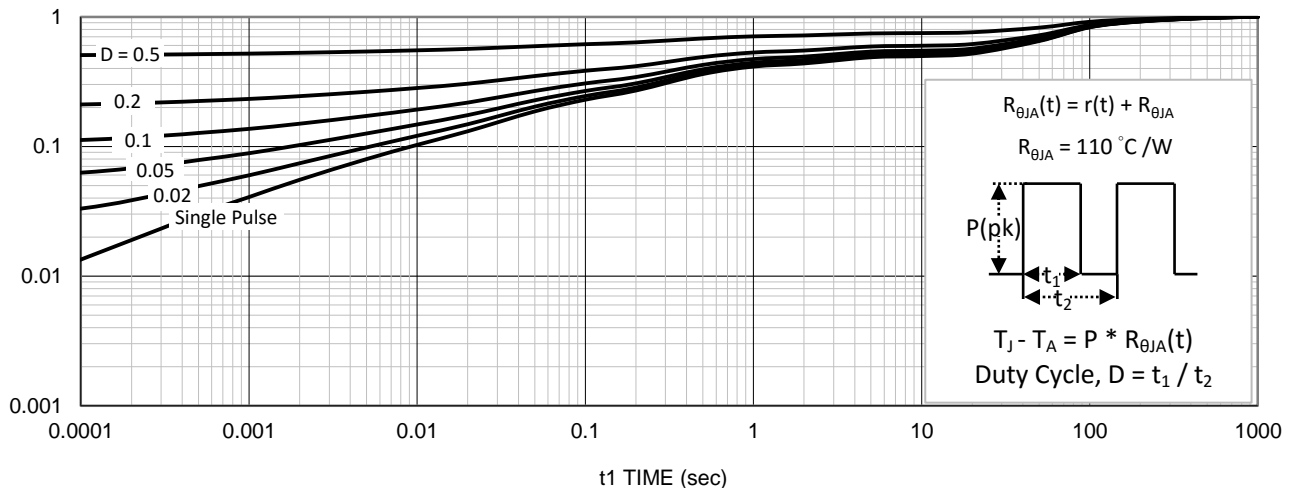
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area



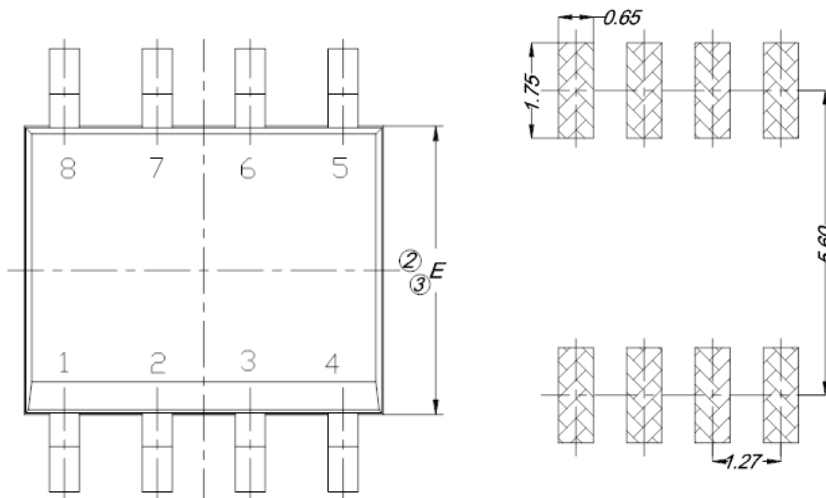
10. Single Pulse Maximum Power Dissipation



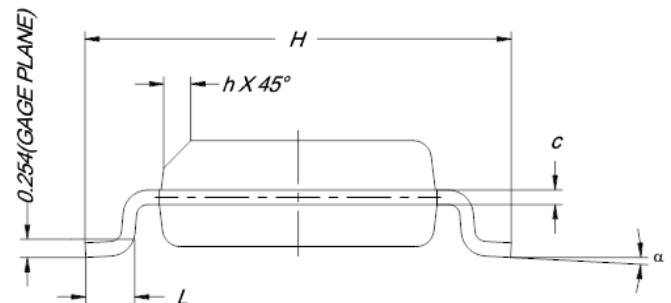
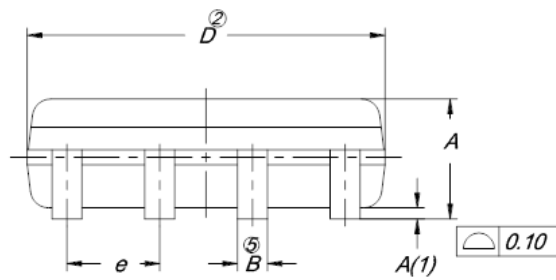
11. Normalized Thermal Transient Junction to Ambient

Package Information

Land Pattern
(Only for Reference)



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	1.35	1.55	1.75
A(1)	0.10	0.18	0.25
B	0.38	0.45	0.51
C	0.19	0.22	0.25
D	4.80	4.90	5.00
E	3.80	3.90	4.00
e	1.27 BSC		
H	5.80	6.00	6.20
L	0.50	0.72	0.93
α	0°	4°	8°
h	0.25	0.38	0.50



Note:

1. All Dimension Are In mm.
2. Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs. Mold Flash, Protrusion Or Gate Burrs Shall Not Exceed 0.10 mm Per Side.
3. Package Body Sizes Determined At The Outermost Extremes Of The Plastic Body Exclusive Of Mold Flash, Tie Bar Burrs, Gate Burrs And Interlead Flash, But Including Any Mismatch Between The Top And Bottom Of The Plastic Body.
4. The Package Top May Be Smaller Than The Package Bottom.
5. Dimension "B" Does Not Include Dambar Protrusion. Allowable Dambar Protrusion Shall Be 0.08 mm Total In Excess Of "B" Dimension At Maximum Material Condition. The Dambar Cannot Be Located On The Lower Radius Of The Foot.