

N & P-Channel 60-V (D-S) MOSFET

Key Features:

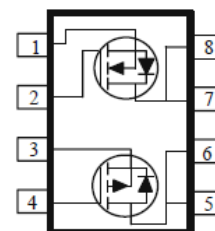
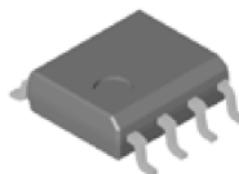
- Low $r_{DS(on)}$ trench technology
- Low thermal impedance
- Fast switching speed

Typical Applications:

- White LED boost converters
- Automotive Systems
- Industrial DC/DC Conversion Circuits



RoHS
COMPLIANT
HALOGEN
FREE



PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (m Ω)	I_D (A)
60	82 @ $V_{GS} = 10V$	4.2
	100 @ $V_{GS} = 4.5V$	3.8
-60	190 @ $V_{GS} = -10V$	-2.8
	250 @ $V_{GS} = -4.5V$	-2.4

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$ UNLESS OTHERWISE NOTED)					
Parameter		Symbol	Nch Limit	Pch Limit	Units
Drain-Source Voltage		V_{DS}	60	-60	V
Gate-Source Voltage		V_{GS}	± 20	± 20	
Continuous Drain Current ^a	$T_A = 25^\circ C$	I_D	4.2	-2.8	A
	$T_A = 70^\circ C$		3.3	-2.2	
Pulsed Drain Current ^b		I_{DM}	30	-15	A
Continuous Source Current (Diode Conduction) ^a		I_S	2.8	-2.5	
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

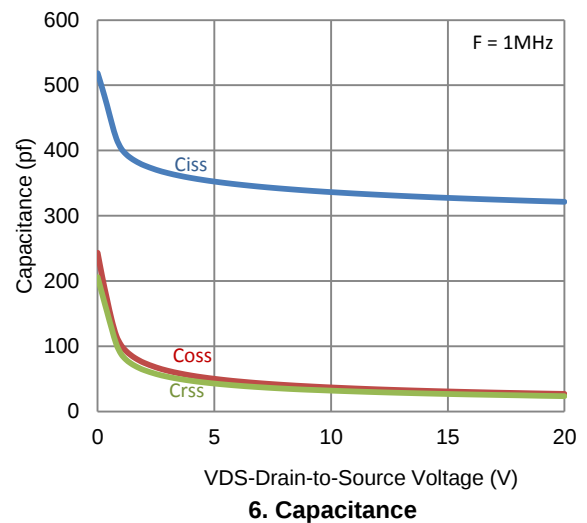
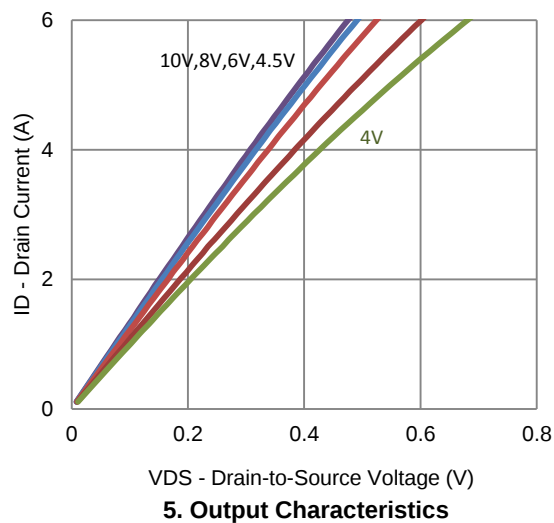
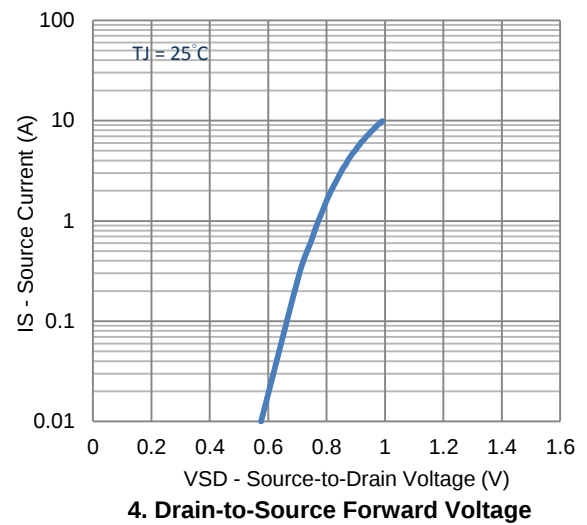
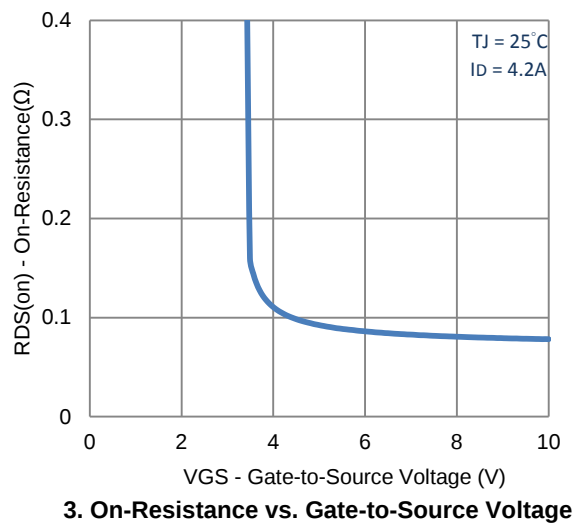
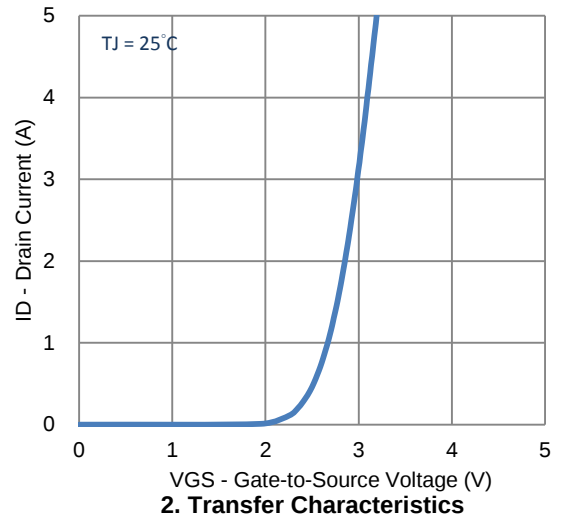
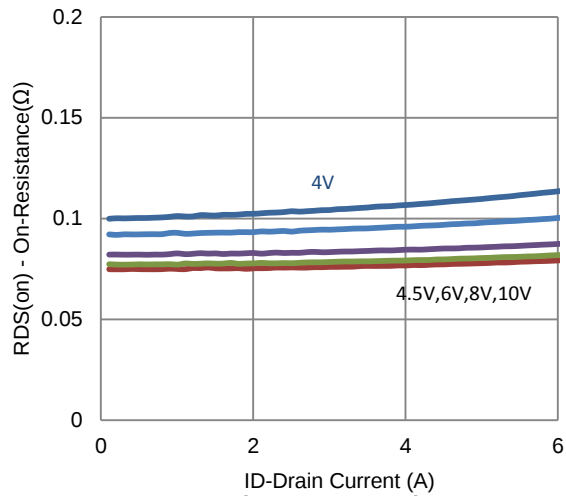
Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 uA (N-ch)	1			V
		V _{DS} = V _{GS} , I _D = -250 uA (P-ch)	-1			V
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V (N-ch)			1	uA
		V _{DS} = -20 V, V _{GS} = 0 V (P-ch)			-1	
On-State Drain Current ^a	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V (N-ch)	5			A
		V _{DS} = -5 V, V _{GS} = -10 V (P-ch)	-5			A
Drain-Source On-Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 4.2 A (N-ch)			82	mΩ
		V _{GS} = 4.5 V, I _D = 3.6 A (N-ch)			100	
		V _{GS} = -10 V, I _D = -2.8 A (P-ch)			190	mΩ
		V _{GS} = -4.5 V, I _D = -2.3 A (P-ch)			250	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 4.2 A (N-ch)		25		S
		V _{DS} = -15 V, I _D = -2.8 A (P-ch)		28		S
Diode Forward Voltage ^a	V _{SD}	I _S = 1.4 A, V _{GS} = 0 V (N-ch)		0.78		V
		I _S = -1.2 A, V _{GS} = 0 V (P-ch)		-0.83		V
Dynamic ^b						
Total Gate Charge	Q _g	N - Channel V _{DS} = 30 V, V _{GS} = 4.5 V, I _D = 4.2 A		5		nC
Gate-Source Charge	Q _{gs}			1.1		
Gate-Drain Charge	Q _{gd}			2.1		
Turn-On Delay Time	t _{d(on)}	N - Channel V _{DD} = 30 V, R _L = 7.1 Ω, I _D = 4.2 A, V _{GEN} = 10 V, R _{GEN} = 6 Ω		4		ns
Rise Time	t _r			6		
Turn-Off Delay Time	t _{d(off)}			16		
Fall Time	t _f			3		
Input Capacitance	C _{iss}	N - Channel V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		327		pF
Output Capacitance	C _{oss}			31		
Reverse Transfer Capacitance	C _{rss}			27		
Total Gate Charge	Q _g	P - Channel V _{DS} = -30 V, V _{GS} = 4.5 V, I _D = -2.8 A		5		nC
Gate-Source Charge	Q _{gs}			1.7		
Gate-Drain Charge	Q _{gd}			2.0		
Turn-On Delay Time	t _{d(on)}	P - Channel V _{DD} = -30 V, R _L = 10.8 Ω, I _D = -2.8 A, V _{GEN} = -10 V, R _{GEN} = 6 Ω		5		ns
Rise Time	t _r			5		
Turn-Off Delay Time	t _{d(off)}			18		
Fall Time	t _f			6		
Input Capacitance	C _{iss}	P - Channel V _{DS} = -15 V, V _{GS} = 0 V, f = 1 MHz		385		pF
Output Capacitance	C _{oss}			40		
Reverse Transfer Capacitance	C _{rss}			28		

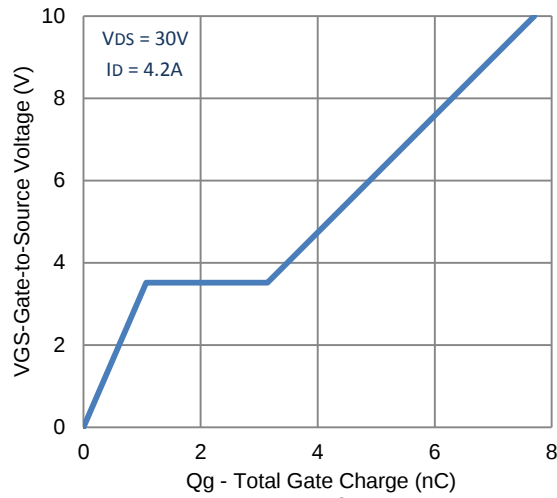
Notes

- a. Pulse test: PW $\leq 300 \mu s$ duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.

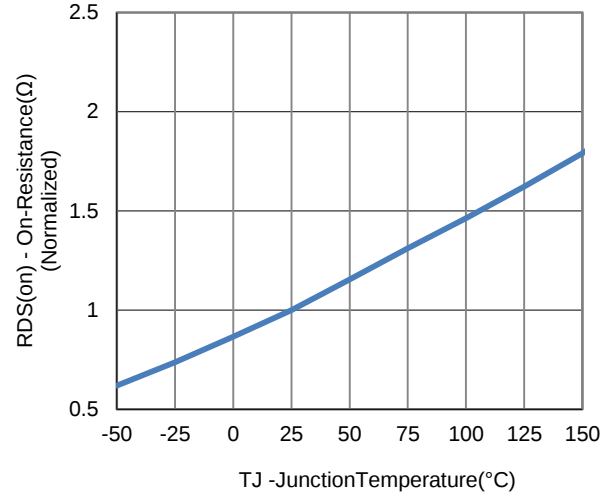
Typical Electrical Characteristics - N-channel



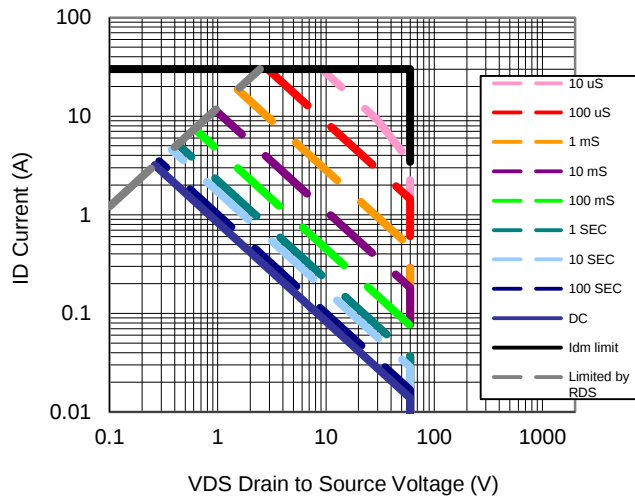
Typical Electrical Characteristics - N-channel



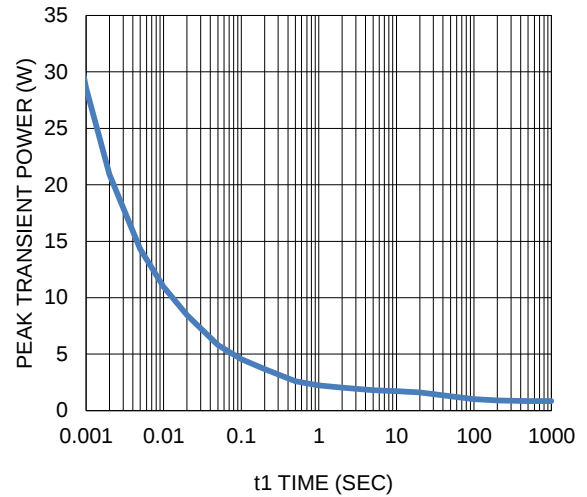
7. Gate Charge



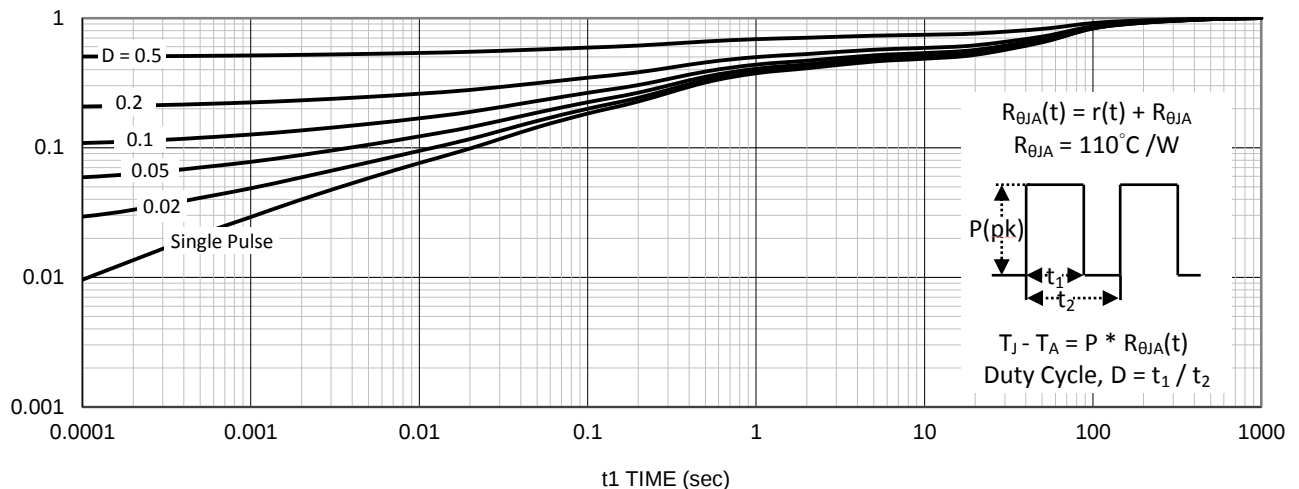
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

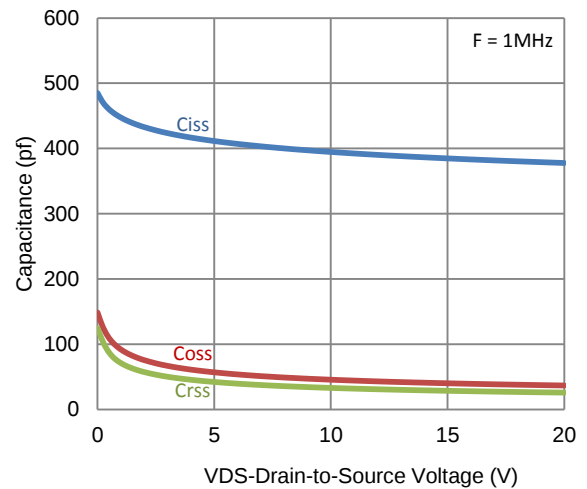
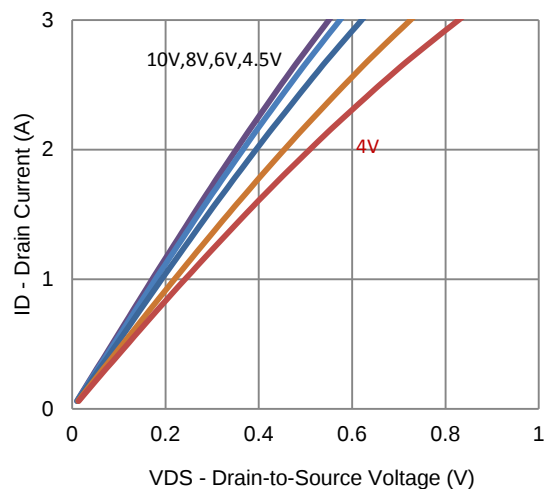
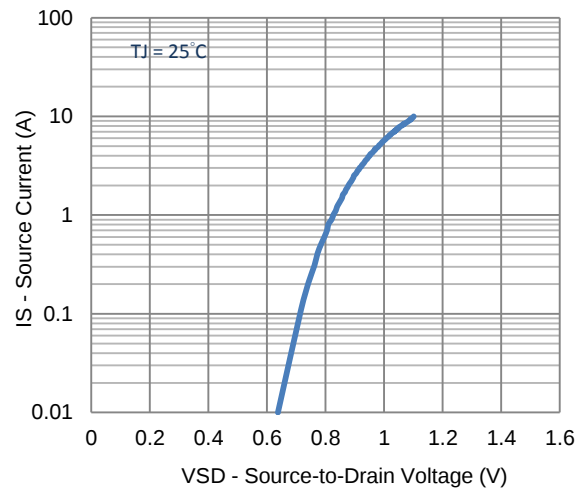
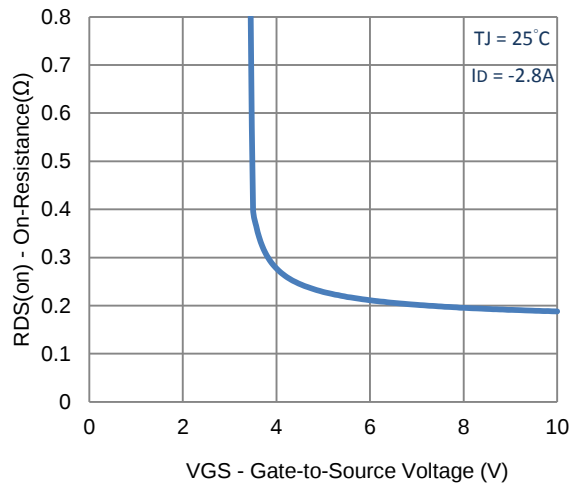
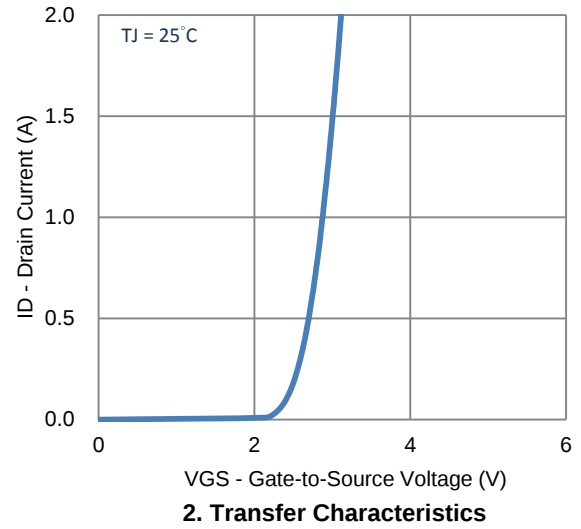
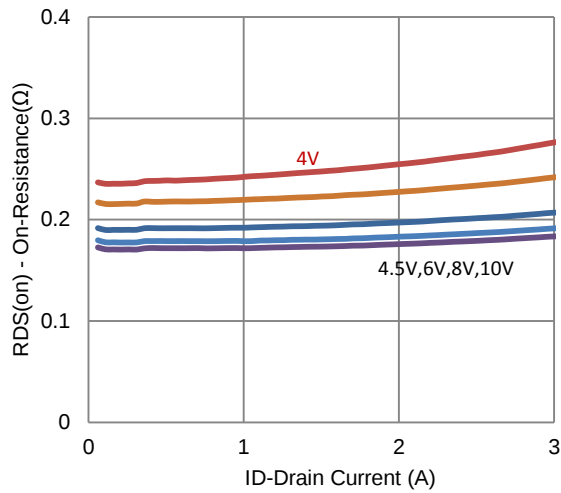


10. Single Pulse Maximum Power Dissipation

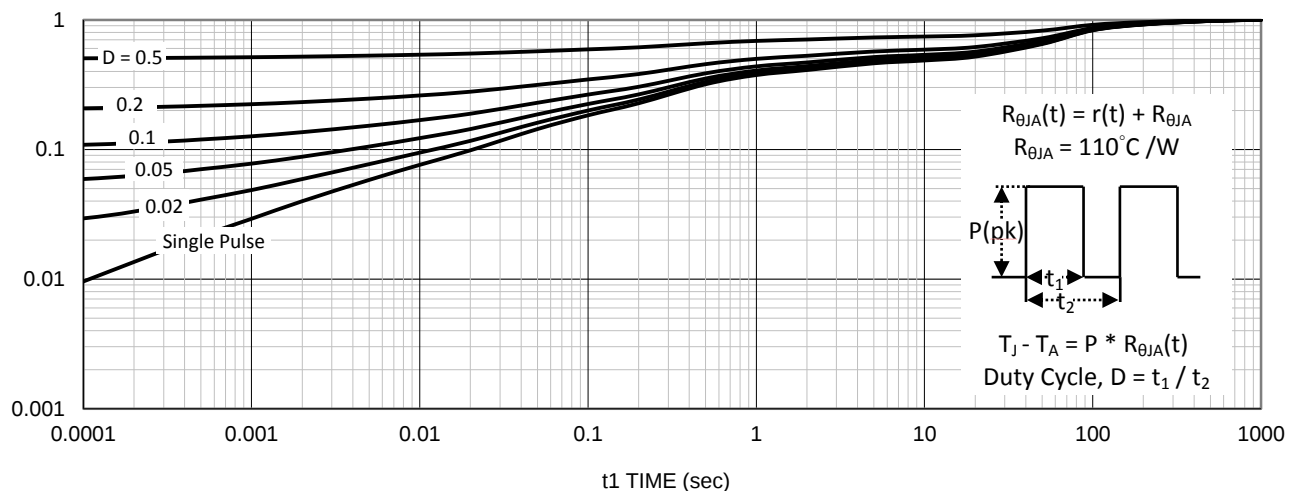
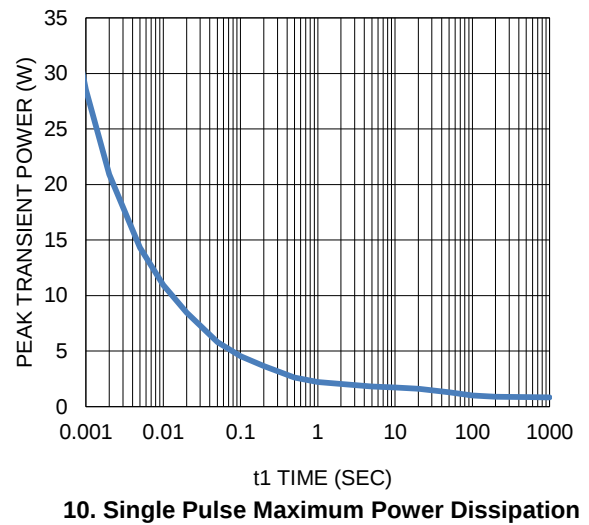
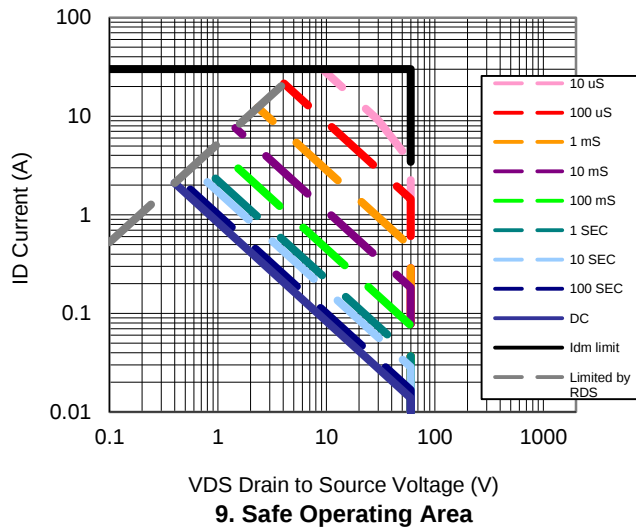
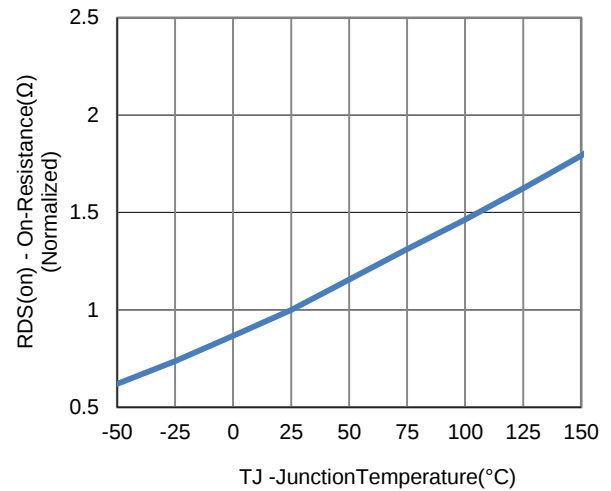
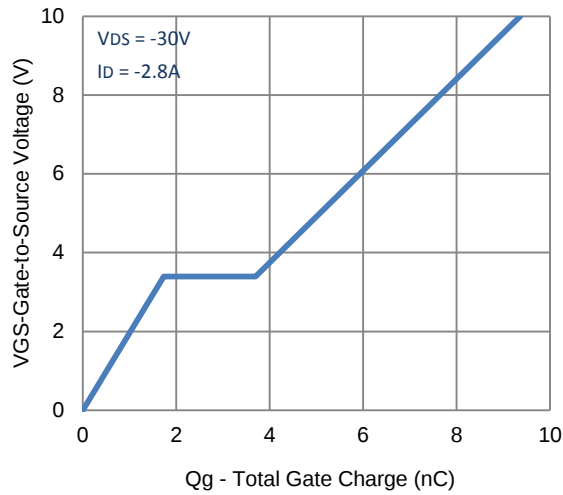


11. Normalized Thermal Transient Junction to Ambient

Typical Electrical Characteristics - P-channel

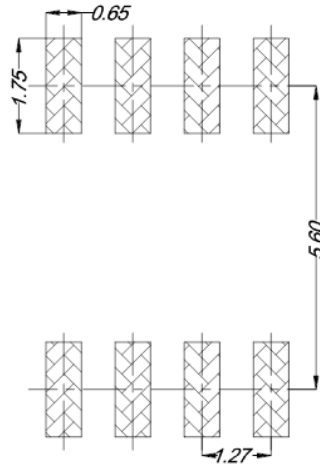
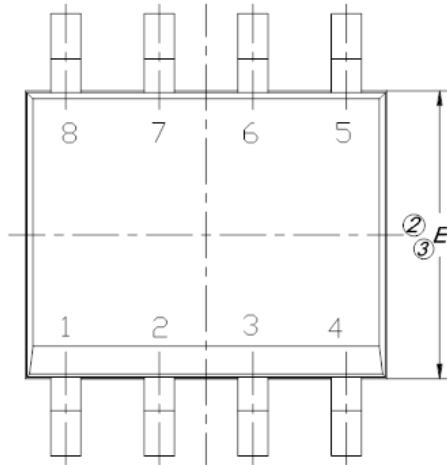


Typical Electrical Characteristics - P-channel

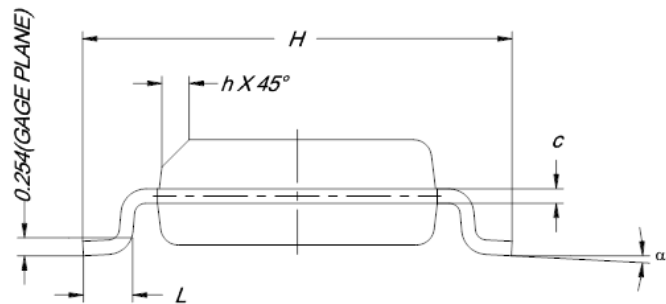
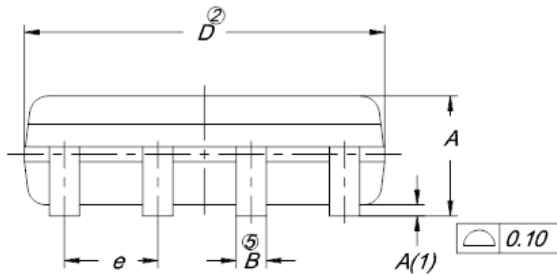


Package Information

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.