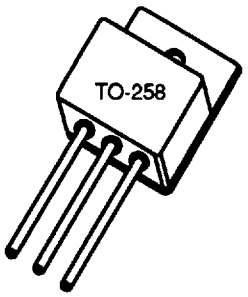
SEME LAB



MOS POWER 4

T-39-15

SML4020HN	400V	23.5A	0.20Ω
SML3520HN	350V	23.5A	0.20Ω
SML4025HN	400V	21.0A	0.25Ω
SML3525HN	350V	21.0A	0.25Ω

N - CHANNEL ENHANCEMENT MODE HIGH VOLTAGE POWER MOSFETS

MAXIMUM RATINGS

All Ratings: T_C = 25°C unless otherwise specified.

Symbol	Parameter	SML 3520HN	SML 4020HN	SML 3525HN	SML 4025HN	UNIT
V_{DSS}	Drain-Source Voltage	350	400	350	400	Volts
I_D	Continuous Drain Current @ T_C = 25°C	23.5		21.0		Amps
I_{DM}	Pulsed Drain Current ①	94		84		
V_{GS}	Gate-Source Voltage	±30				Volts
P_D	Total Power Dissipation @ T_C = 25°C	250				Watts
	Linear Derating Factor	2.0				W/°C
T_J,T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150				°C
T_L	Lead Temperature: 0.063" from Case for 10 Sec.	300				

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions / Part Number		MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage (V_{GS} = 0V, I_D = 250 μA)	SML4020HN / SML4025HN	400			Volts
		SML3520HN / SML3525HN	350			
I_D(ON)	On State Drain Current ② (V_{DS} > I_D(ON) x R_{DS}(ON) Max, V_{GS} = 10V)	SML4020HN / APT3520HN	23.5			Amps
		APT4025HN / SML3525HN	21.0			
R_{DS}(ON)	Drain-Source On-State Resistance ② (V_{GS} = 10V, 0.5 I_D [Cont.])	SML4020HN / SML3520HN			0.20	Ohms
		SML4025HN / SML3525HN			0.25	
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = V_{DSS}, V_{GS} = 0V)				250	μA
	Zero Gate Voltage Drain Current (V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125°C)				1000	
I_{GSS}	Gate-Source Leakage Current (V_{GS} = ±30V, V_{DS} = 0V)				±100	nA
V_{GS}(TH)	Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 1.0mA)		2		4	Volts

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\Theta JC}$	Junction to Case			0.50	°C/W
$R_{\Theta JA}$	Junction to Ambient			40	

SEMELAB PLC
Coventry Road,
Lutterworth,
Leicestershire,
LE17 4JB.

Telephone: (0455) 556565
Telex: 341927
Facsimile: (0455) 552612

DYNAMIC CHARACTERISTICS

SML4020/3520/4025/3525HN

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{DC}	Drain-to-Case Capacitance	f = 1 MHz		24	36	pF
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 25V, f = 1 MHz		2420	2950	
C_{oss}	Output Capacitance			550	770	
C_{rss}	Reverse Transfer Capacitance			205	310	
Q_g	Total Gate Charge ③	V_{GS} = 10V, V_{DD} = 0.5 V_{DSS}, I_D = I_D [Cont.] @ 25°C		94	130	nC
Q_{gs}	Gate-Source Charge			11	16	
Q_{gd}	Gate-Drain ("Miller") Charge			47	70	
$t_d(on)$	Turn-on Delay Time	V_{GS} = 15V, V_{DD} = 0.5 V_{DSS}, I_D = I_D [Cont.] @ 25°C, R_G = 1.8Ω		13	26	ns
t_r	Rise Time			19	38	
$t_d(off)$	Turn-off Delay Time			65	97	
t_f	Fall Time			21	42	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions		MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)	SML4020HN / SML3520HN			23.5	Amps
		SML4025HN / SML3525HN			21.0	
I_{SM}	Pulsed Source Current ① (Body Diode)	SML4020HN / SML3520HN			94	
		SML4025HN / SML3525HN			84	
V_{SD}	Diode Forward Voltage ② (V_{GS} = 0V, I_S = -I_D [Cont.])				1.3	Volts
t_{rr}	Reverse Recovery Time (I_S = -I_D [Cont.], dI_S/dt = 100A/µs)		180	360	720	ns
Q_{rr}	Reverse Recovery Charge (I_S = -I_D [Cont.], dI_S/dt = 100A/µs)		3	6	12	µC

SAFE OPERATING AREA CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
SOA1	Safe Operating Area	V_{DS} = 0.4 V_{DSS}, I_{DS} = P_D / 0.4 V_{DSS}, t = 1 Sec.	250			Watts
SOA2	Safe Operating Area	I_{DS} = I_D [Cont.], V_{DS} = P_D / I_D [Cont.], t = 1 Sec.	250			
I_{LM}	Inductive Current Clamped	SML4020HN / SML3520HN	94			Amps
		SML4025HN / SML3525HN	84			

①Repetitive Rating: Pulse width limited by maximum junction temperature. See Transient Thermal Impedance Curve. (Fig.1)

②Pulse Test: Pulse width < 380 µS, Duty Cycle < 2%

③See MIL-STD-750 Method 3471

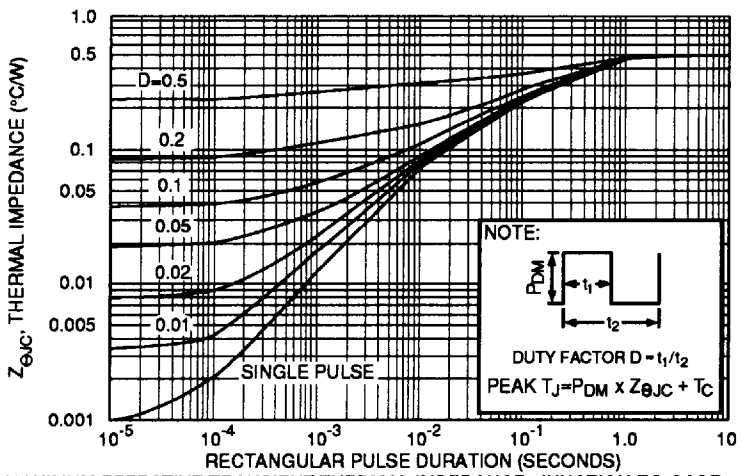


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

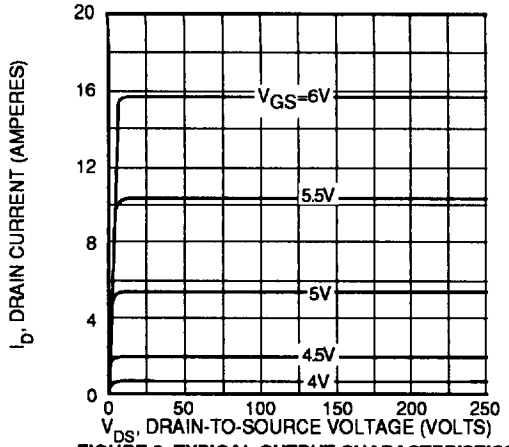


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

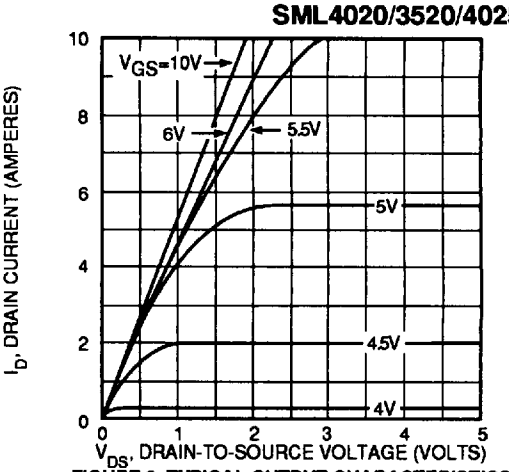


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

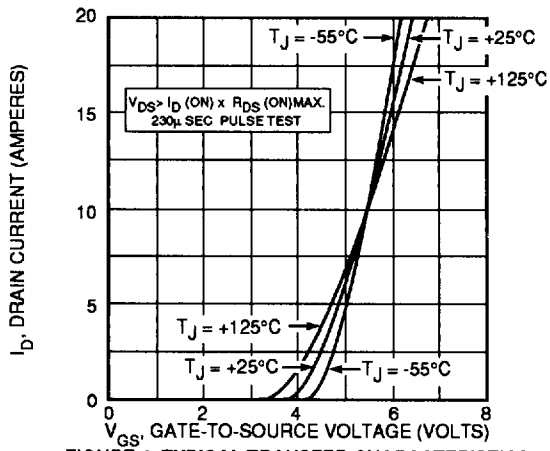


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

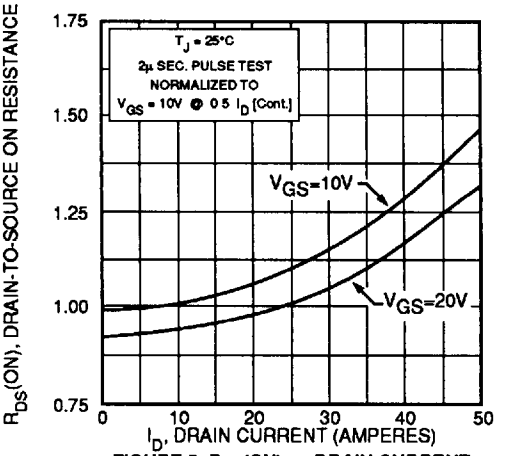


FIGURE 5, R_{DS}(ON) vs DRAIN CURRENT

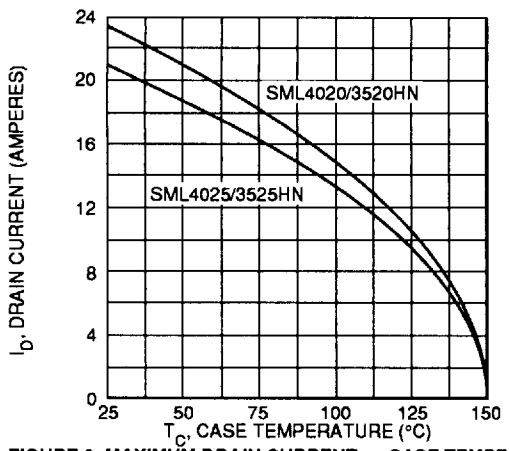


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

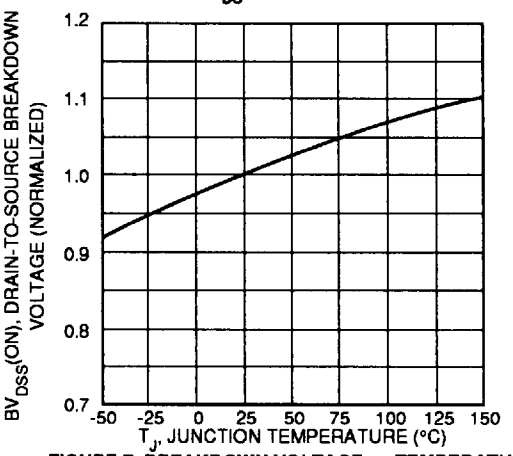


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

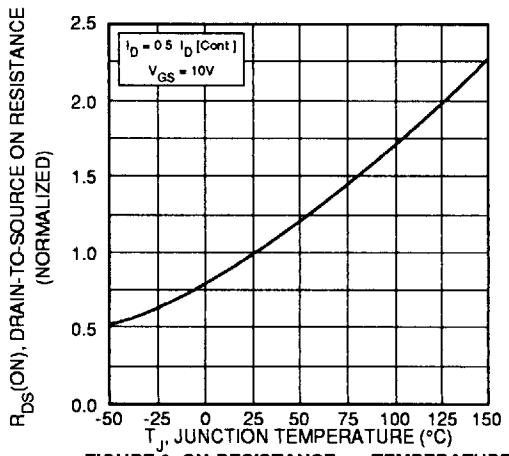


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

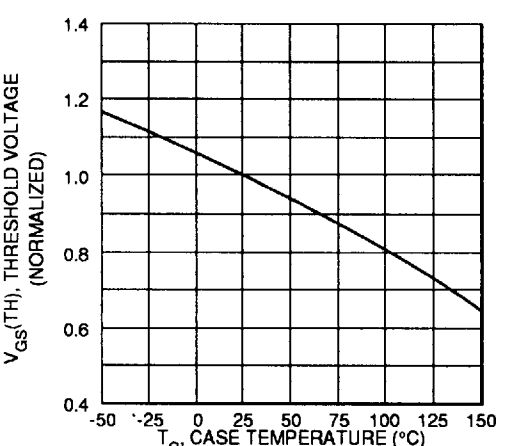


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

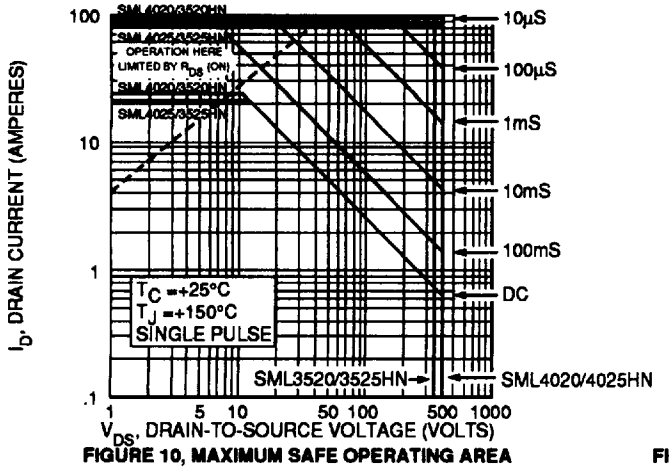


FIGURE 10, MAXIMUM SAFE OPERATING AREA

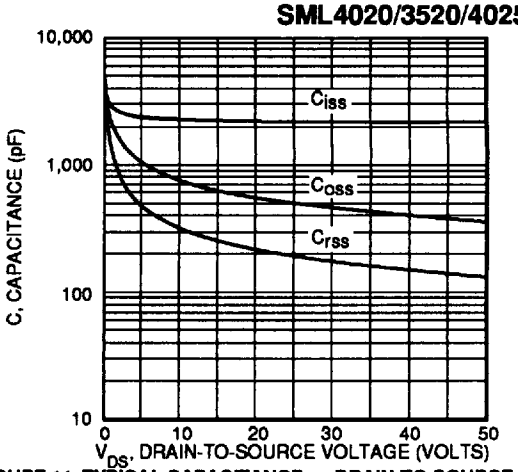


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

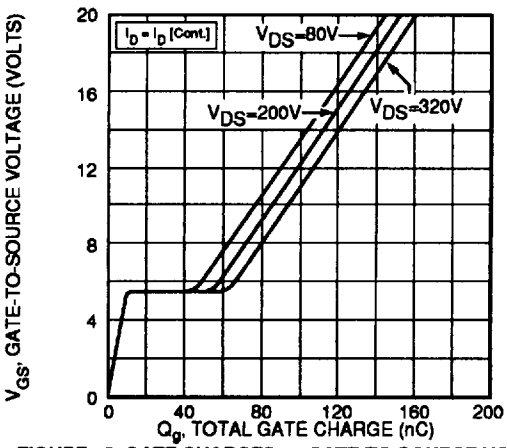


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

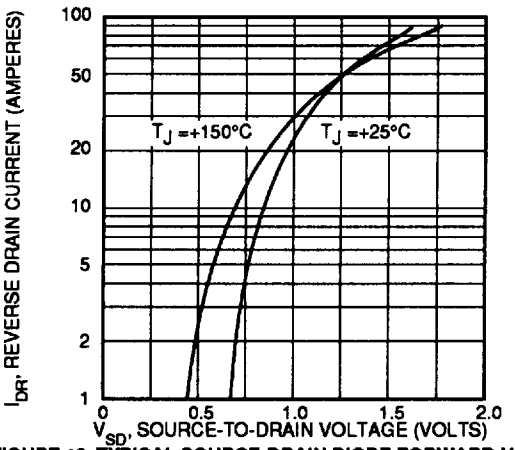
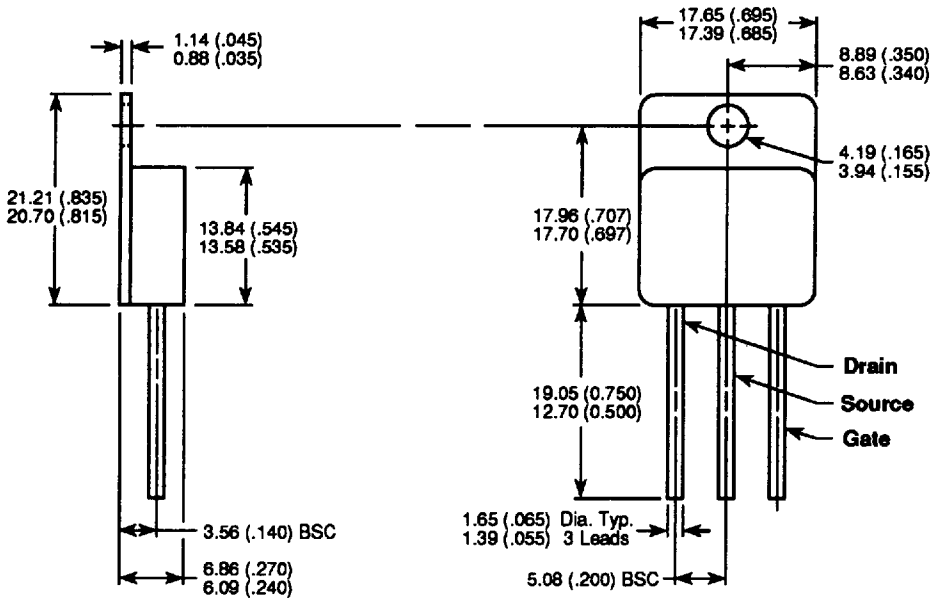


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-258AA Package Outline



Dimensions in Millimeters and (Inches)