

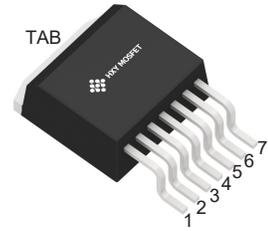


Features

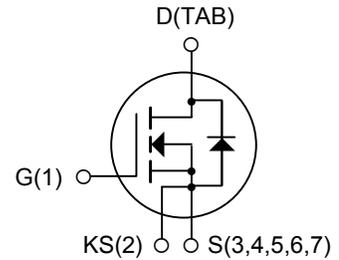
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low capacitances
- Avalanche Ruggednes

Applications

- Solar Inverters
- Switch Mode Power Supplies
- Auxiliary power supplies
- Smart meters



TO-263-7L



Ordering Part Number	Package	Qty(PCS)
MSC750SMA170SA	TO-263-7L	50



Maximum Ratings (T_c = 25 °C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-source voltage	V _{DS}	1700	V
Continuous drain current T _c = 25°C T _c = 100°C	I _D	6.7 5	A
Pulsed drain current (T _c = 25°C, t _p limited by T _{jmax})	I _{D pulse}	16.7	A
Avalanche energy, single pulse (L=10mH)	E _{AS}	1000	mJ
Gate-Source voltage	V _{GS}	-4/+18	V
Gate-Source voltage (dynamic, Absolute maximum values)	V _{GSmax}	-8/+22	V
Power dissipation (T _c = 25°C)	P _{tot}	86	W
Operating junction and storage temperature	T _j , T _{stg}	-55...+175	°C

- Example of acceptable V_{GS} waveform





Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	1.7	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

Electrical Characteristic (at $T_j = 25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition	
		min.	typ.	max.			
Static Characteristic							
Drain-source breakdown voltage	BV_{DSS}	1700	-	-	V	$V_{GS}=0V, I_D=100\mu A$	
Gate threshold voltage	$V_{GS(th)}$	1.8	3	4.5	V	$V_{DS}=V_{GS}, I_D=380\mu A$	
Zero gate voltage drain current	I_{DSS}	-	1	10	μA	$V_{DS}=1700V, V_{GS}=0V$ $T_j=25^\circ\text{C}$ $T_j=175^\circ\text{C}$	
		-	5	-			
Gate-source leakage current	I_{GSS}	-	-	100	nA	$V_{GS}=20V, V_{DS}=0V$	
Drain-source on-state resistance	$R_{DS(on)}$	-	700	910	m	$V_{GS}=18V, I_D=1A,$ $T_j=25^\circ\text{C}$ $T_j=175^\circ\text{C}$	
		-	1280	-			
Dynamic Characteristic							
Input Capacitance	C_{iss}	-	285	-	pF	$V_{DS} = 1000V$ $V_{GS} = 0V$ $T_J = 25^\circ\text{C}$ $V_{AC} = 25mV$ $f = 1MHz$	
Output Capacitance	C_{oss}	-	15.3	-			
Reverse Transfer Capacitance	C_{rss}	-	2.2	-			
Gate Total Charge	Q_G	-	16.5	-	nC	$V_{DS} = 1000V$ $V_{GS} = -5/18V$ $I_D = 1A$	
Gate-Source charge	Q_{gs}	-	2.7	-			
Gate-Drain charge	Q_{gd}	-	12.5	-			
Turn-On Switching Energy	E_{ON}	-	73.9	-	μJ	$V_{DD} = 1000V$ $V_{GS} = -3.5/+18V$ $I_D = 2A$ $R_G = 10$ $L = 1880\mu H$	
Turn-Off Switching Energy-	E_{OFF}	-	20.4	-			
Turn-on delay time	$t_{d(on)}$	-	6.2	-	ns		
Rise time	t_r	-	13.7	-			
Turn-off delay time	$t_{d(off)}$	-	9.4	-			
Fall time	t_f	-	45.4	-			
Gate resistance	R_G	-	18	-			$V_{AC} = 25mV, f=1MHz$



Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}		4		V	$V_{GS}=0V, I_{SD}=1A,$ $T_J=25^{\circ}C$
			3.8			$V_{GS}=0V, I_{SD}=1A,$ $T_J=175^{\circ}C$
Body Diode Reverse Recovery Time	t_{rr}	-	33.5	-	ns	$V_R = 1000V,$ $V_{GS} = -3.5V/+18V$ $I_D = 2A, R_g = 30$ $di/dt = 1000A/\mu S$ $L = 1880\mu H$
Body Diode Reverse Recovery Charge	Q_{rr}	-	56.1	-	nC	



Typical Performance Characteristics

Fig 1. Output Characteristic ($T_J = -55^\circ\text{C}$)

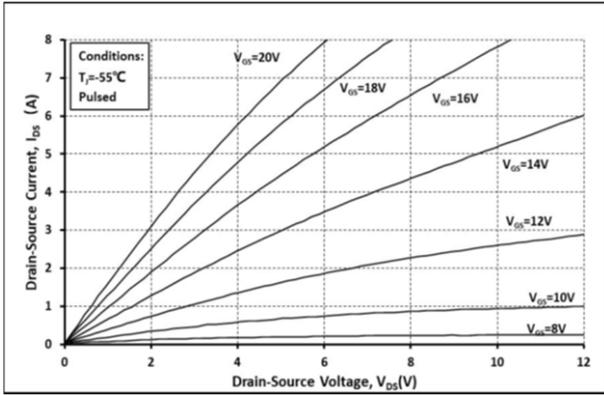


Fig 2. Output Characteristic ($T_J = 25^\circ\text{C}$)

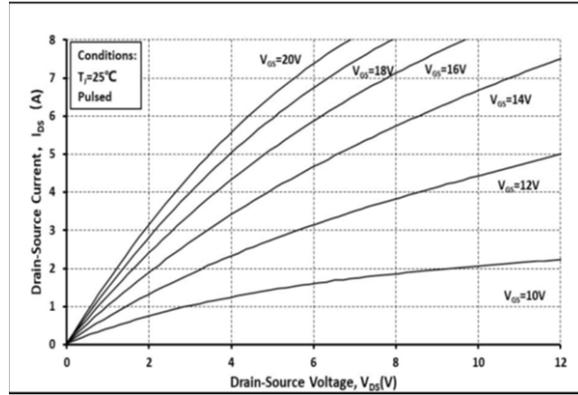


Fig 3. Output Characteristic ($T_J = 175^\circ\text{C}$)

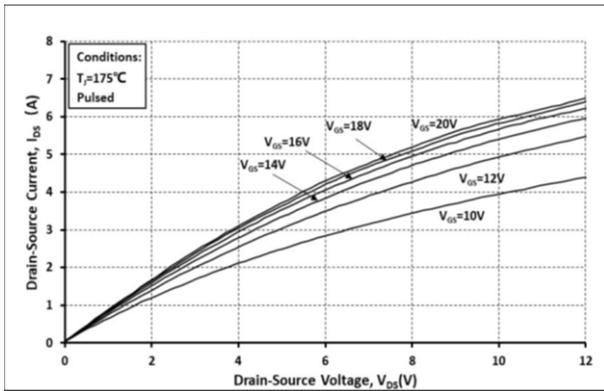


Fig 4: $R_{DS(on)}$ Vs I_{DS} Characteristic

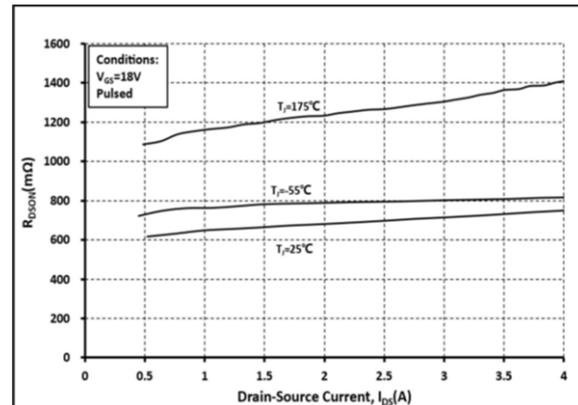


Fig 5: $R_{DS(on)}$ vs. Temperature

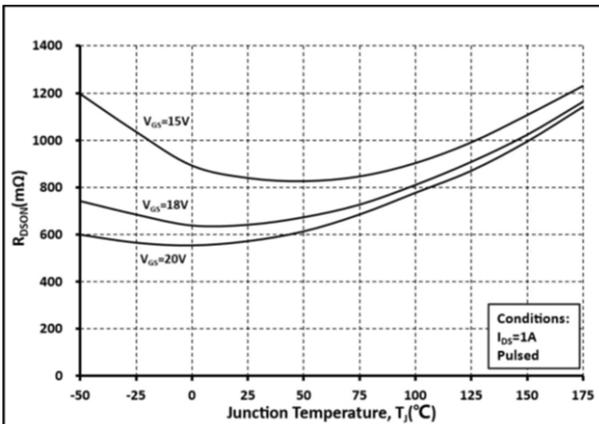


Fig 6: Transfer Characteristic

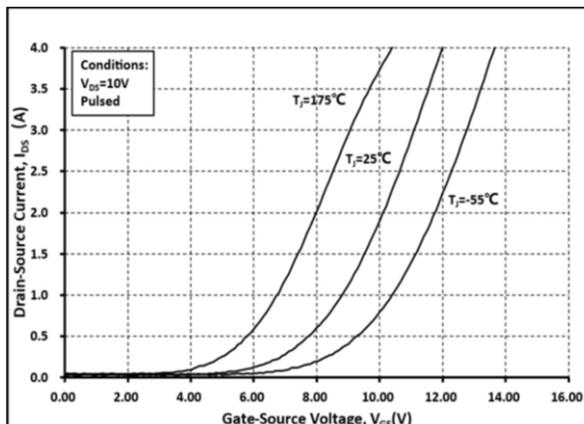




Fig 7: Body-diode Characteristic ($T_J=-55^{\circ}\text{C}$)

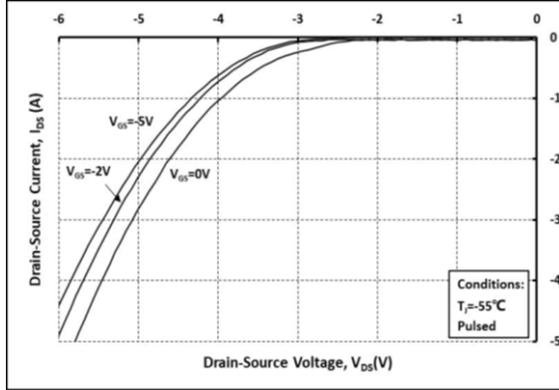


Fig 8: Body-diode Characteristic ($T_J=25^{\circ}\text{C}$)

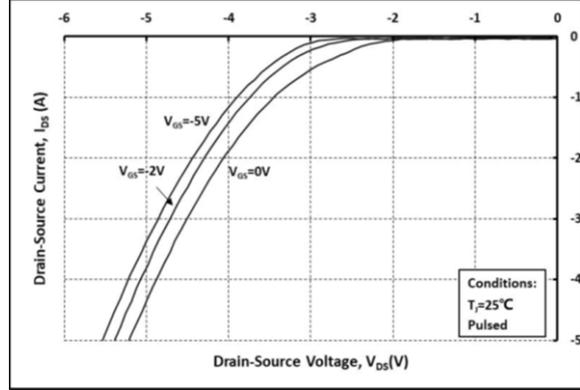


Fig 9: Body-diode Characteristic ($T_J=175^{\circ}\text{C}$)

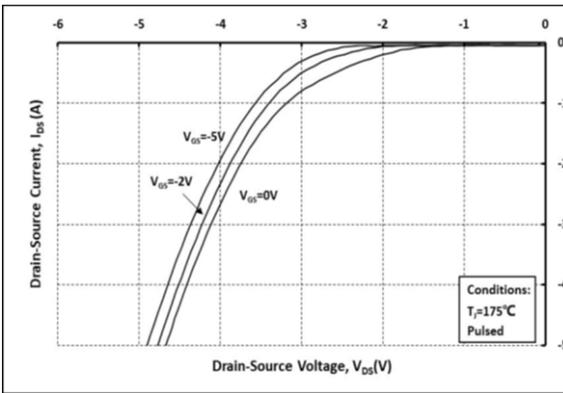


Fig 10: V_{TH} Vs T_J Temperature Characteristic

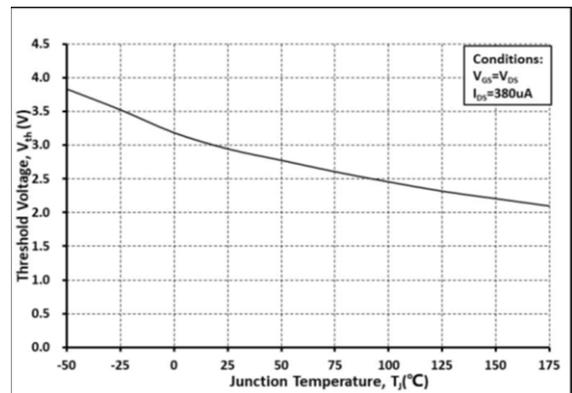


Fig 11: Gate Charge Characteristics

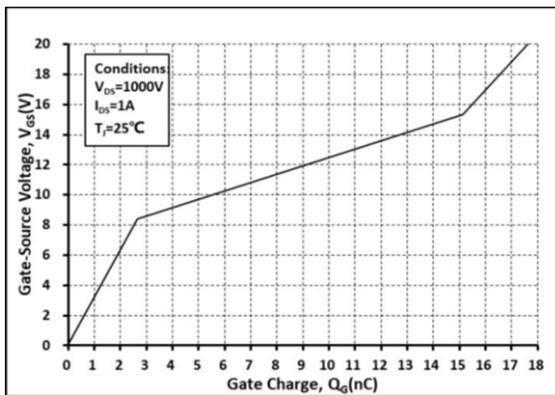


Fig 12: 3rd Quadrant Characteristic ($T_J=-55^{\circ}\text{C}$)

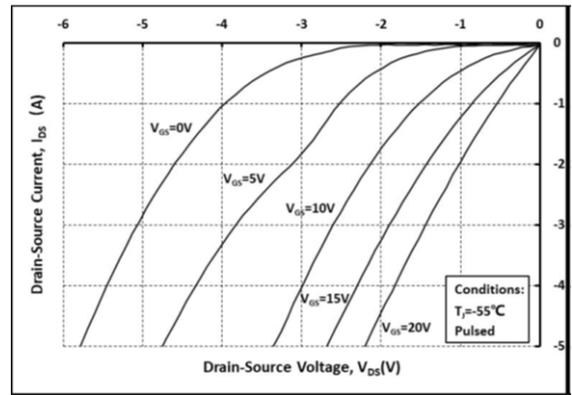




Fig 13: 3rd Quadrant Characteristic($T_J=25^\circ\text{C}$)

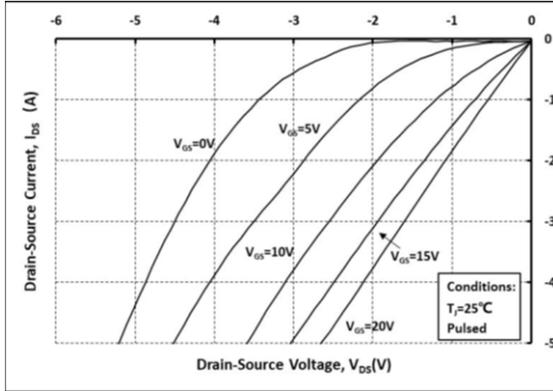


Fig 14: 3rd Quadrant Characteristic($T_J=175^\circ\text{C}$)

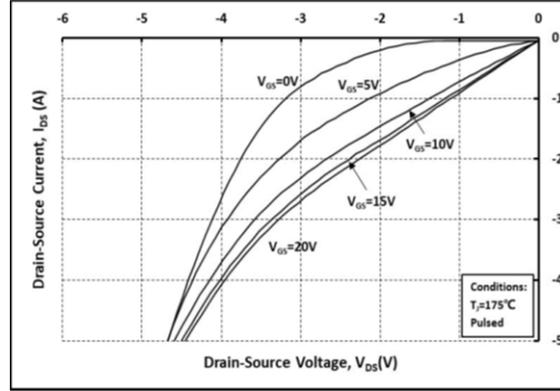


Fig 15: Capacitance Characteristic

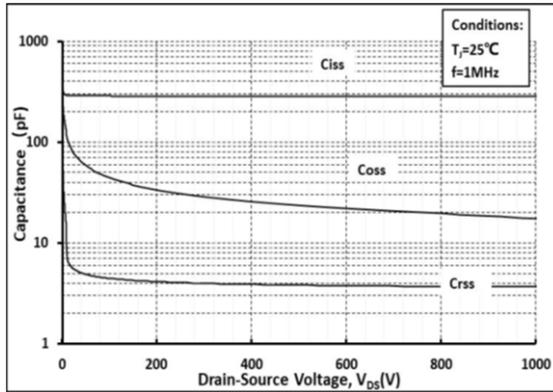


Fig 16: Safe Operating Area

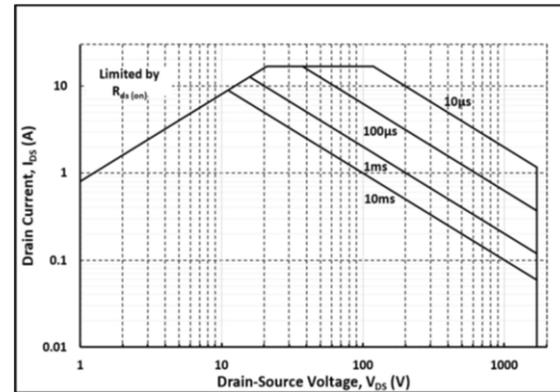
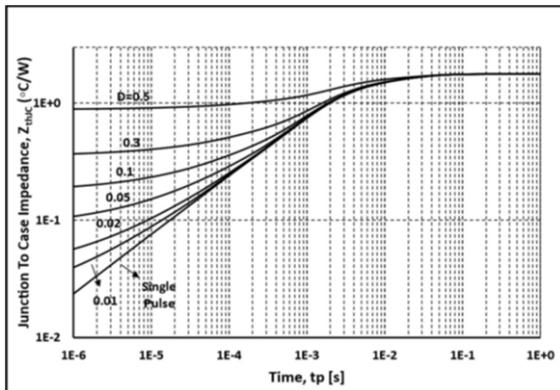


Fig 17: Transient Thermal Impedance





Test Circuit Schematic

Figure A. Definition of switching times

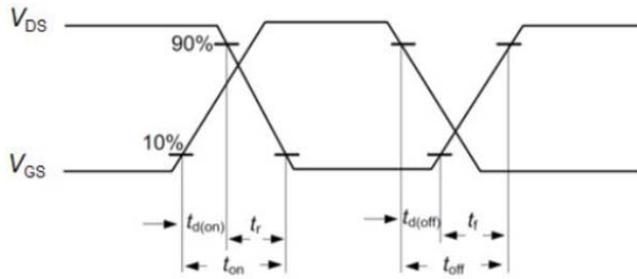


Figure B. Dynamic test circuit

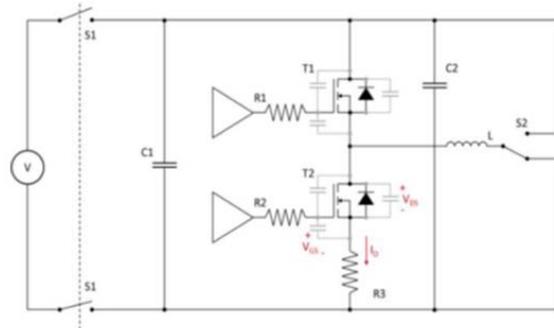


Figure C. Definition of body diodeswitching characteristics

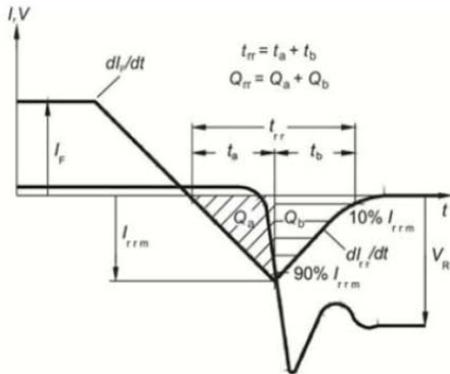
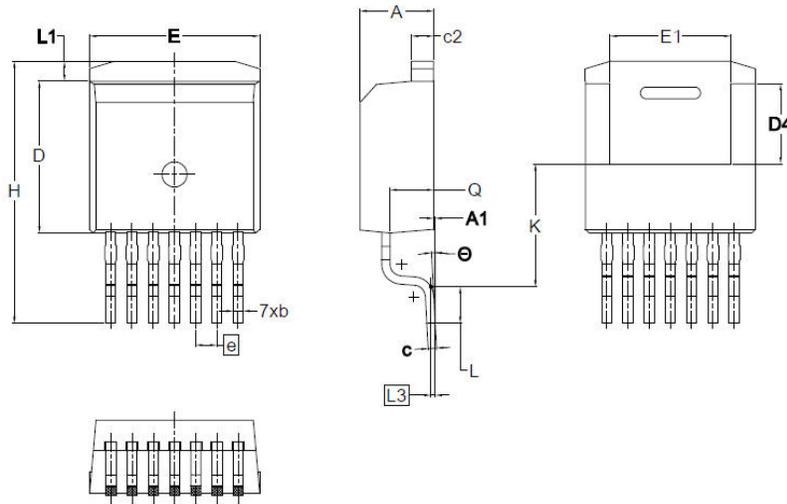


Figure C. Definition of diode switching characteristics



Package Dimensions

Package TO-263-7L



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	4.30	4.40	4.50
A1	0.00	0.10	0.25
b	0.50	0.60	0.70
c	0.45	0.50	0.60
c2	1.20	1.30	1.40
D	8.93	9.08	9.23
D4	4.65	4.80	4.95
E	10.08	10.18	10.28
E1	6.82	7.22	7.62
e	1.27 BSC		
H	15.00	15.70	16.00
K	7.30		
L	1.90	2.20	2.50
L1	1.00	1.20	1.40
L3	0.25 BSC		
Q	2.45	2.60	2.75
theta	0°	3°	7°



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