

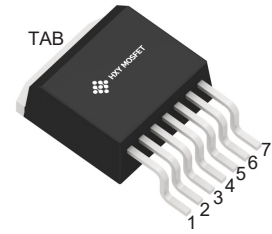


Features

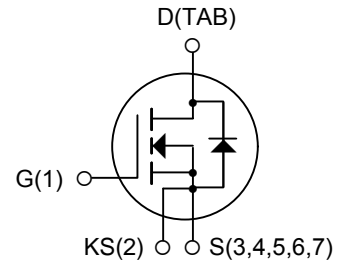
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low capacitances
- Avalanche Ruggednes

Applications

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



TO-263-7L



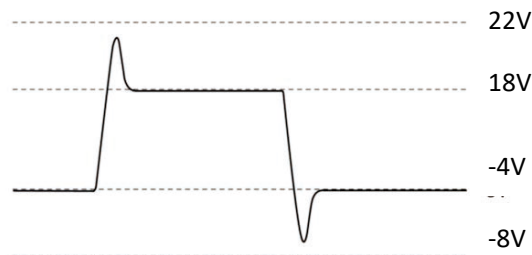
Ordering Part Number	Package	Qty(PCS)
MSC750SMA170SA	TO-263-7L	800



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	$V_R = 1000V,$ $V_{GS} = -3.5V/+18V$ $I_D = 2A, R_g = 30$
Body Diode Reverse Recovery Charge	Q_{rr}	-	56.1	-	nC	$di/dt = 1000A/\mu S$ $L = 1880\mu H$



Typical Performance Characteristics

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

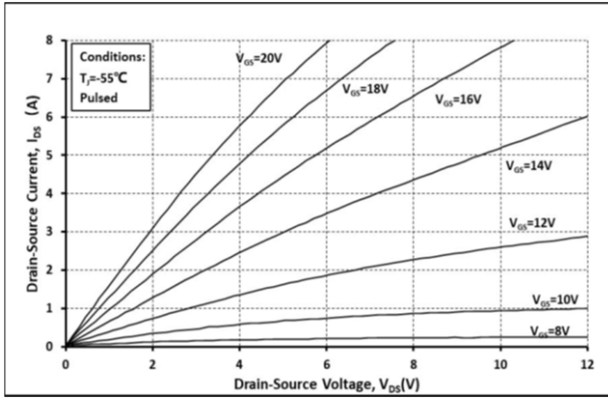


Fig 2. Output Characteristic ($T_J = 25^\circ\text{C}$)

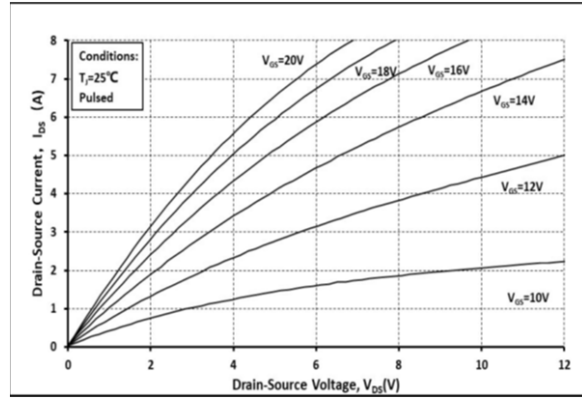


Fig 3. Output Characteristic ($T_J = 175^\circ\text{C}$)

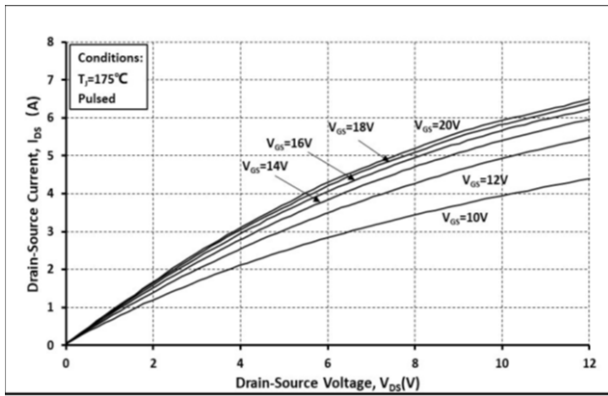


Fig 4: $R_{DS(on)}$ Vs I_{DS} Characteristic

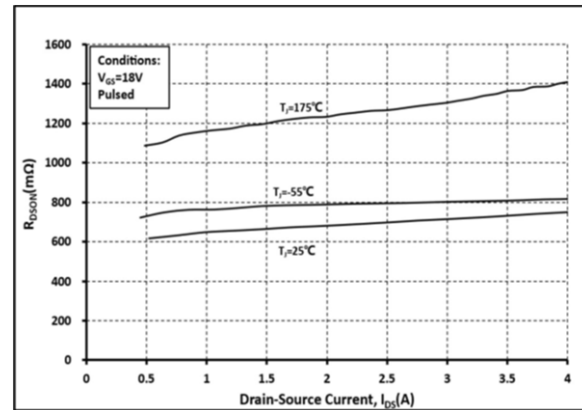


Fig 5: $R_{DS(on)}$ vs. Temperature

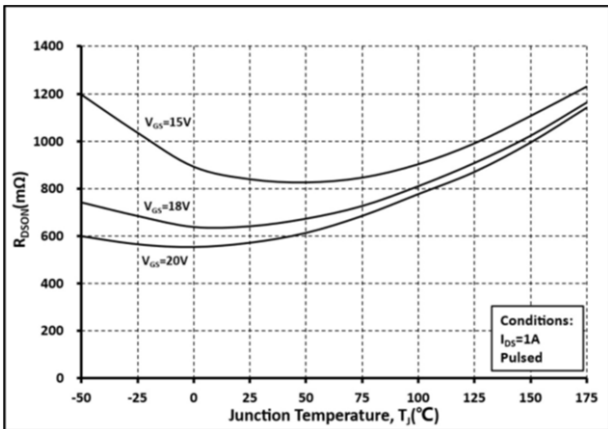


Fig 6: Transfer Characteristic

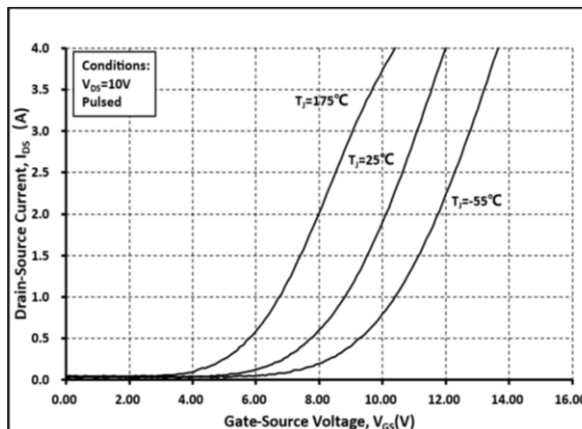




Fig 7: Body-diode Characteristic ($T_J=-55^{\circ}\text{C}$)

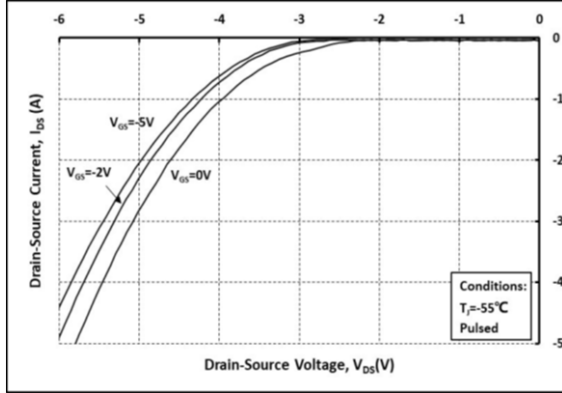


Fig 8: Body-diode Characteristic ($T_J=25^{\circ}\text{C}$)

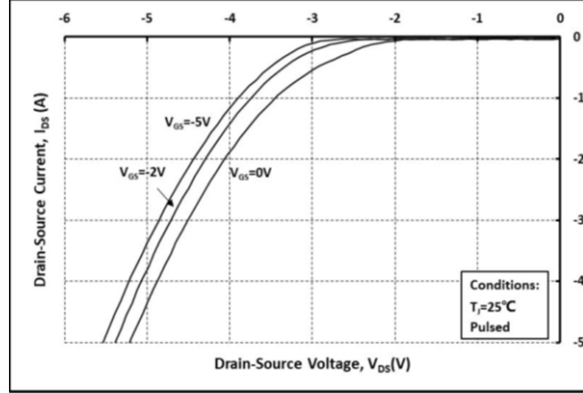


Fig 9: Body-diode Characteristic ($T_J=175^{\circ}\text{C}$)

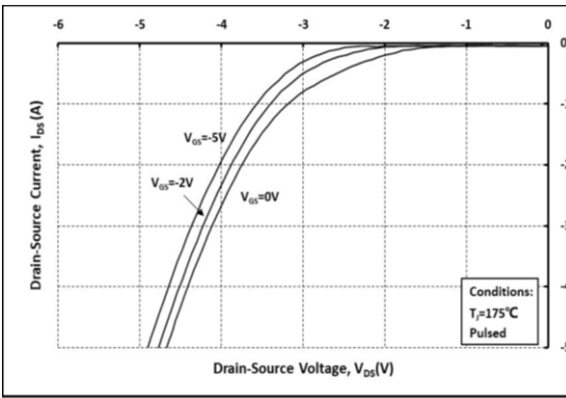


Fig 10: V_{TH} Vs T_J Temperature Characteristic

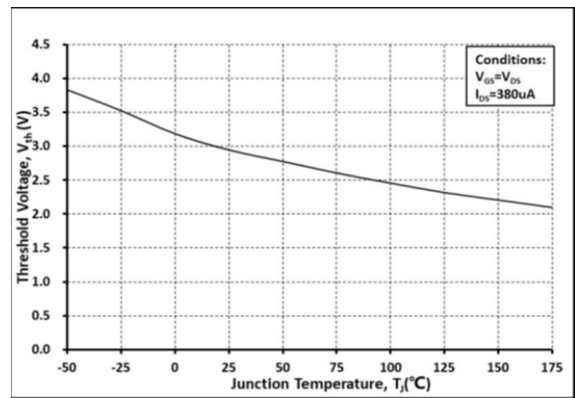


Fig 11: Gate Charge Characteristics

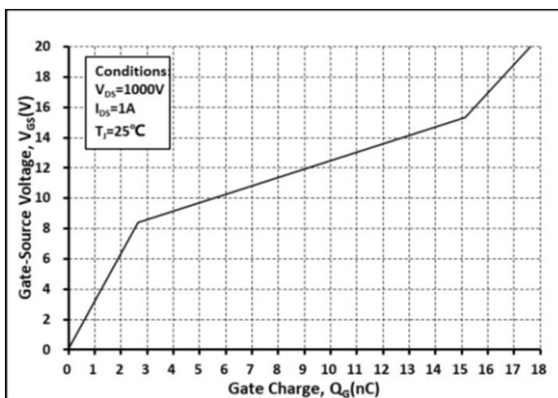


Fig 12: 3rd Quadrant Characteristic ($T_J=-55^{\circ}\text{C}$)

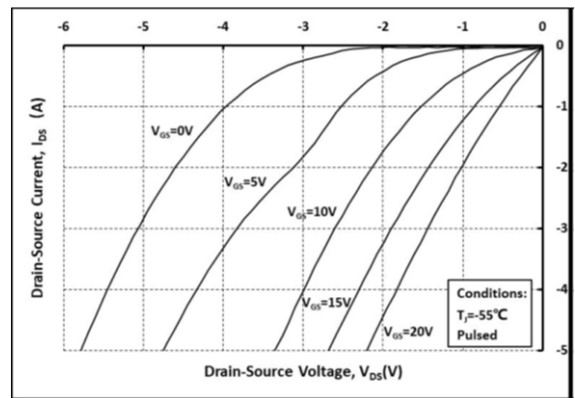




Fig 13: 3rd Quadrant Characteristic($T_J=25^\circ\text{C}$)

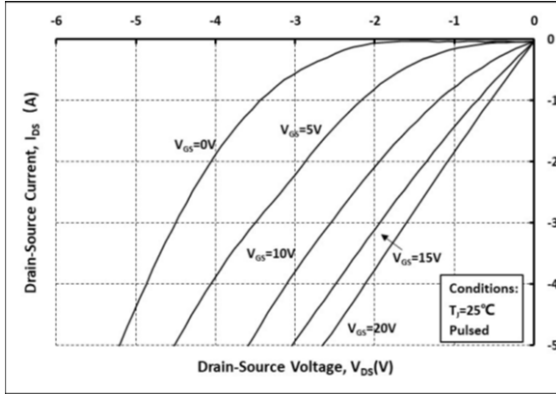


Fig 14: 3rd Quadrant Characteristic($T_J=175^\circ\text{C}$)

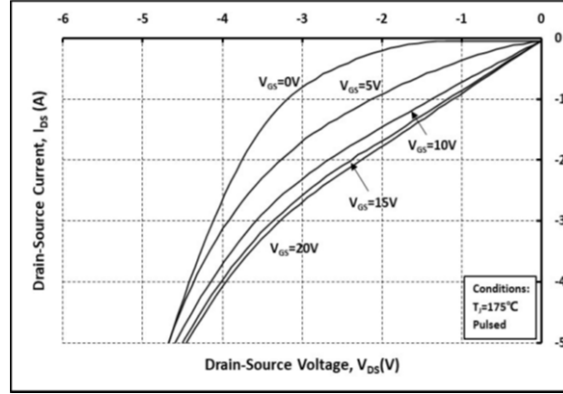


Fig 15: Capacitance Characteristic

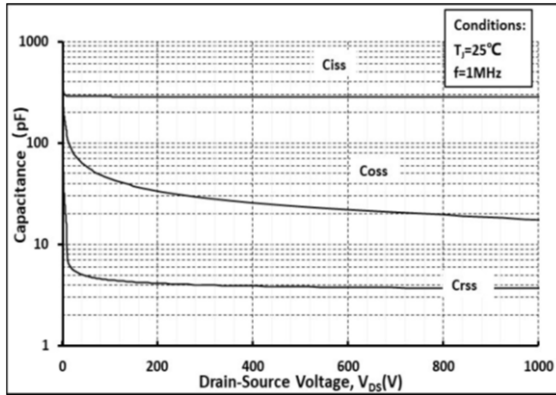


Fig 16: Safe Operating Area

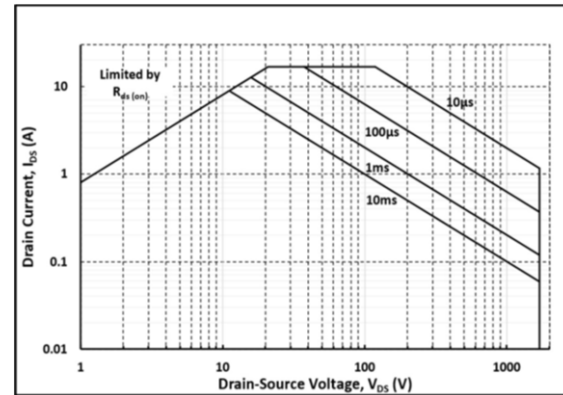
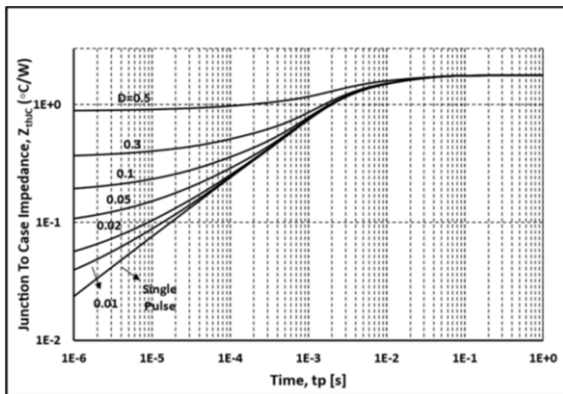


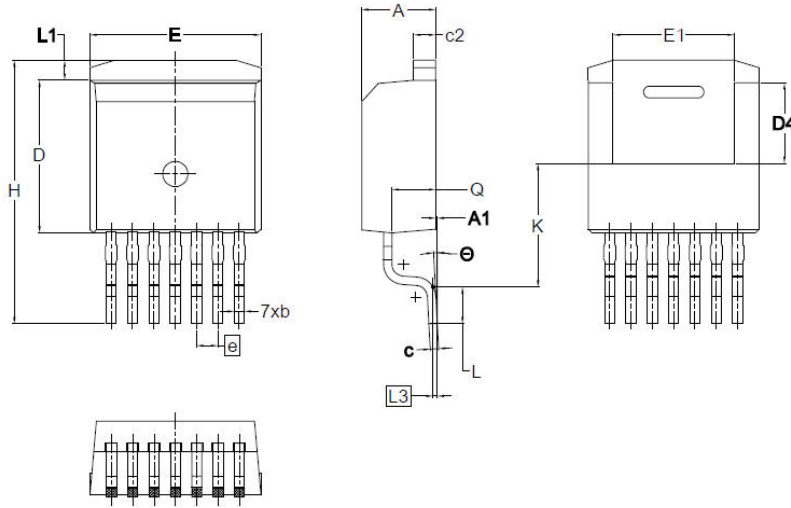
Fig 17: Transient Thermal Impedance





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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