20V(D-S) Dual N-Channel Enhancement Mode Power MOS FET

General Features

- V_{DS} = 20V,I_D =11A
  $R_{DS(ON)}$ < 7mΩ @ V_{GS}=2.5V
  $R_{DS(ON)}$ < 9mΩ @ V_{GS}=4.5V
  ESD Rating: 2000V HBM
- High power and current handing capability
- Lead free product is acquired
- Surface mount package
- ESD protected

RoHS Compliant

Lead Free

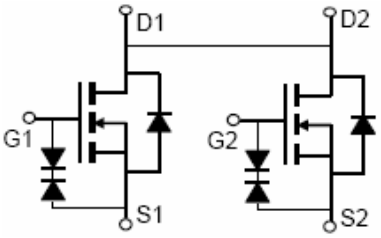
Application

- PWM application
- Load switch

Marking and pin assignment

PIN Configuration

TSSOP-8 top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MSC0211GE	MSC0211GE	TSSOP-8	Ø330mm	12mm	3000 units

Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±10	V
Drain Current-Continuous	I_D	11	A
Drain Current-Pulsed (Note 1)	I_{DM}	44	A
Maximum Power Dissipation	P_D	1.6	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	78	℃/W

Electrical Characteristics (T_A=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	20		-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V,V_{GS}=0V	-	-	1	μA
Parameter	**Symbol**	**Condition**	**Min**	**Typ**	**Max**	**Unit**
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±10V,V_{DS}=0V	-	-	±10	μA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	0.6	0.8	1.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=10A	-	5.5	7	mΩ
		V_{GS}=2.5V, I_D=5.5A	-	7	9	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=11A	25	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=10V,V_{GS}=0V, F=1.0MHz	-	1710	-	PF
Output Capacitance	C_{oss}		-	232	-	PF
Reverse Transfer Capacitance	C_{rss}		-	200	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=10V,R_L=1Ω V_{GS}=10V,R_{GEN}=3Ω	-	2.5		nS
Turn-on Rise Time	t_r		-	7.2		nS
Turn-Off Delay Time	$t_{d(off)}$		-	49		nS
Turn-Off Fall Time	t_f		-	10.8		nS
Total Gate Charge	Q_g	V_{DS}=10V,I_D=10A, V_{GS}=4.5V	-	17.5		nC
Gate-Source Charge	Q_{gs}		-	1.5	-	nC
Gate-Drain Charge	Q_{gd}		-	4.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=1A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	11	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

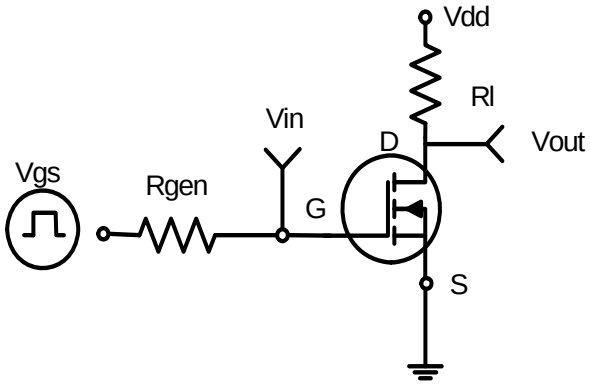


Figure 1:Switching Test Circuit

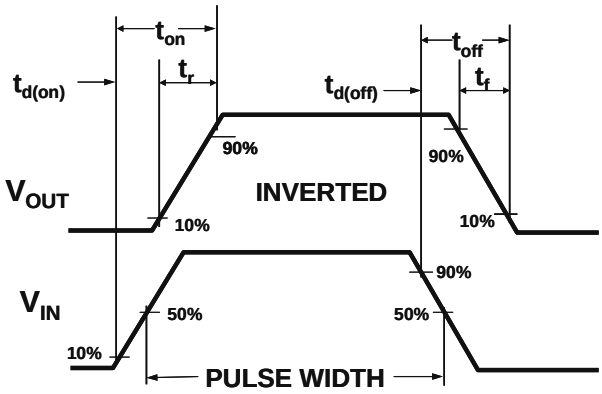


Figure 2:Switching Waveforms

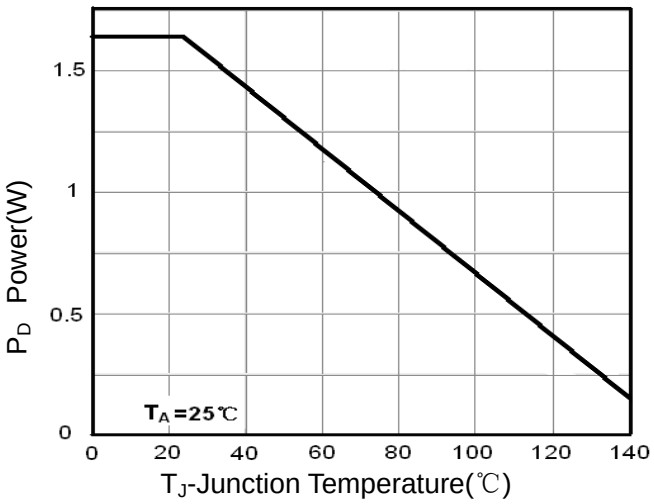


Figure 3 Power Dissipation

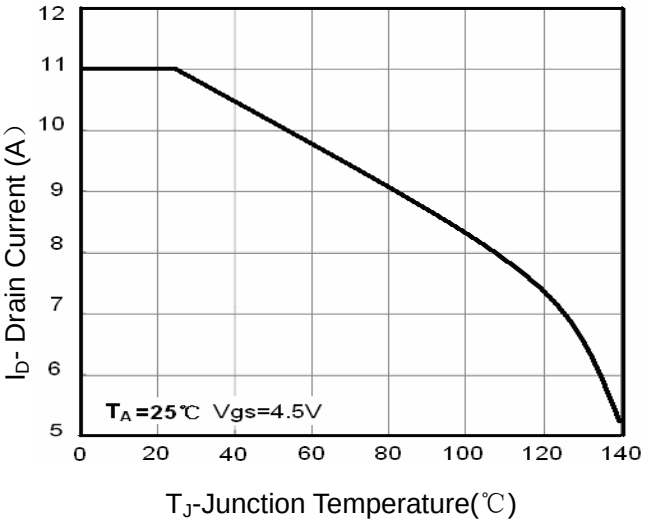


Figure 4 Drain Current

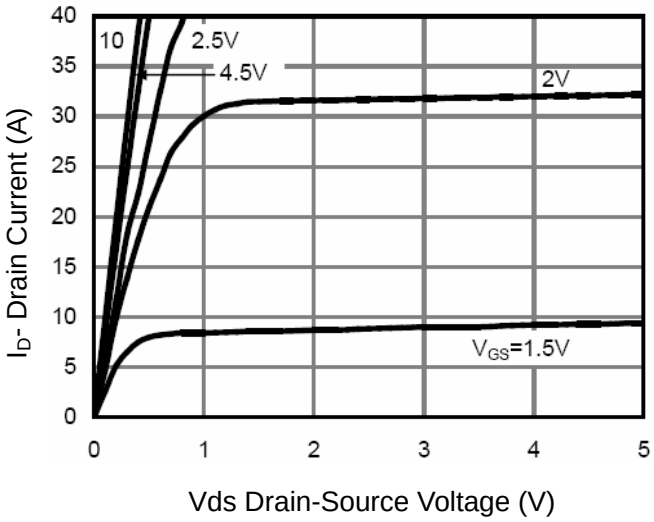


Figure 5 Output Characteristics

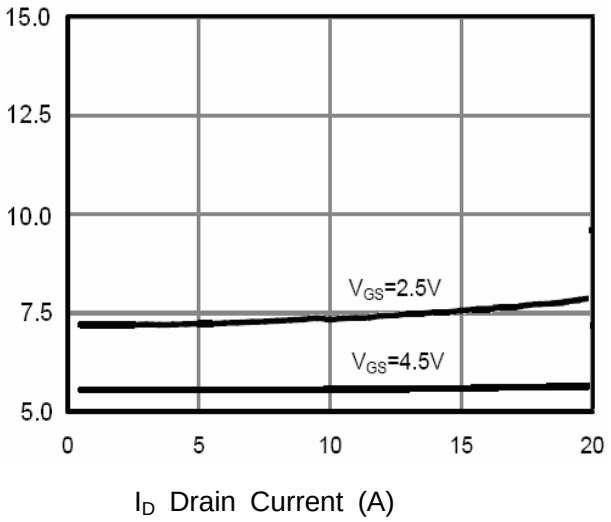


Figure 6 Drain-Source On-Resistance

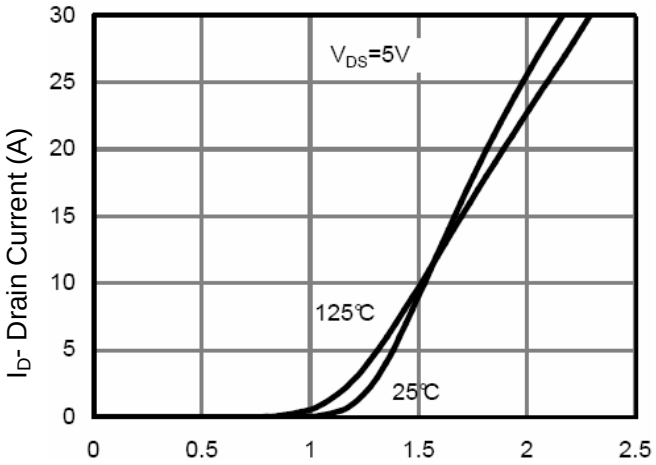


Figure 7 Transfer Characteristics

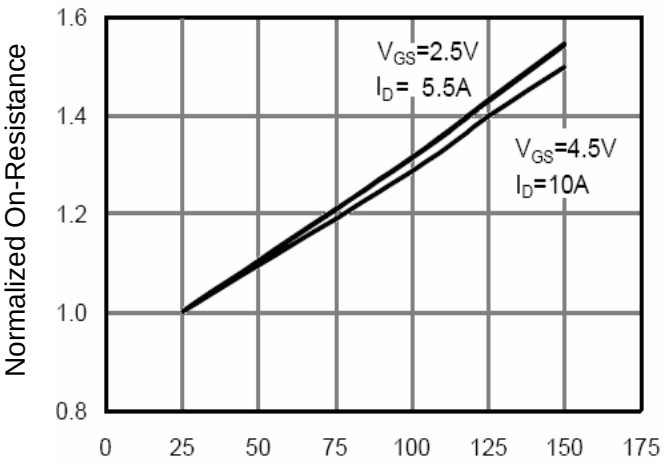


Figure 8 Drain-Source On-Resistance

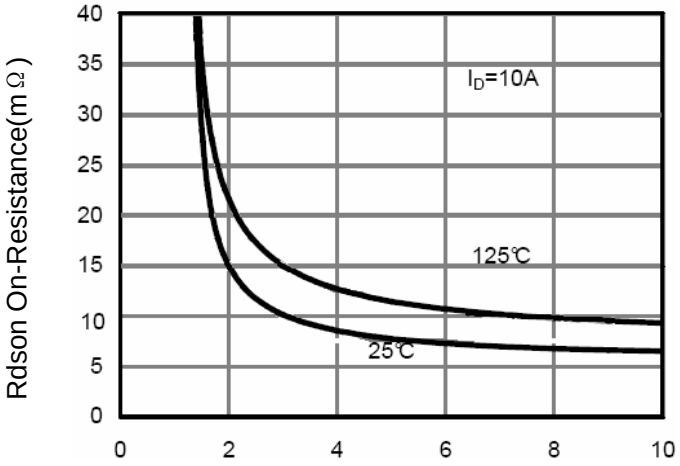


Figure 9 Rdson vs Vgs

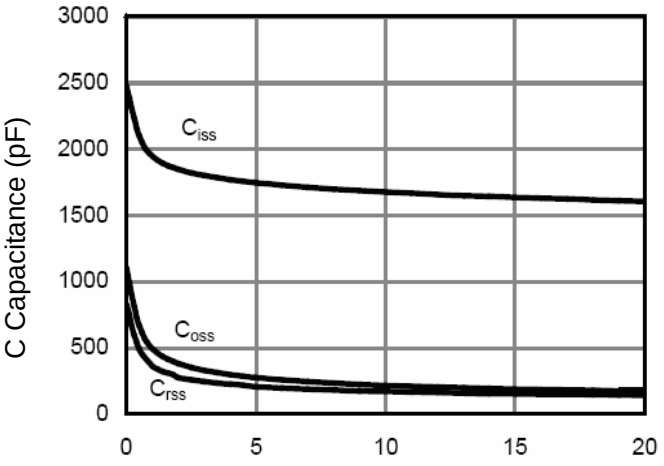


Figure 10 Capacitance vs Vds

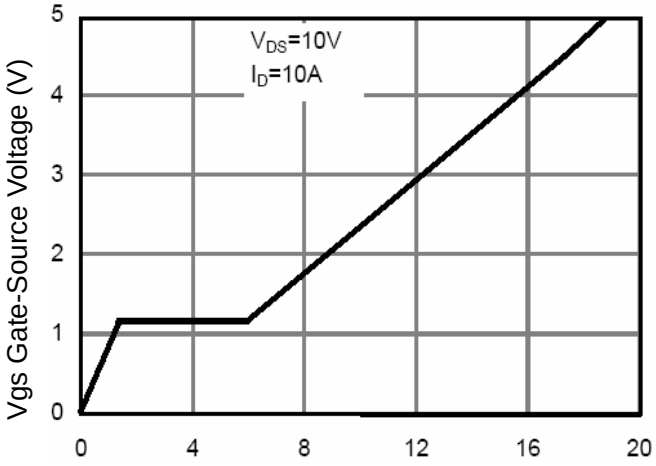


Figure 11 Gate Charge

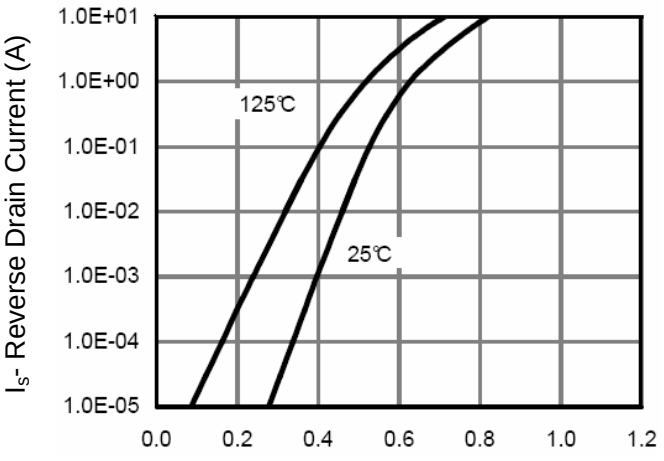


Figure 12 Source- Drain Diode Forward

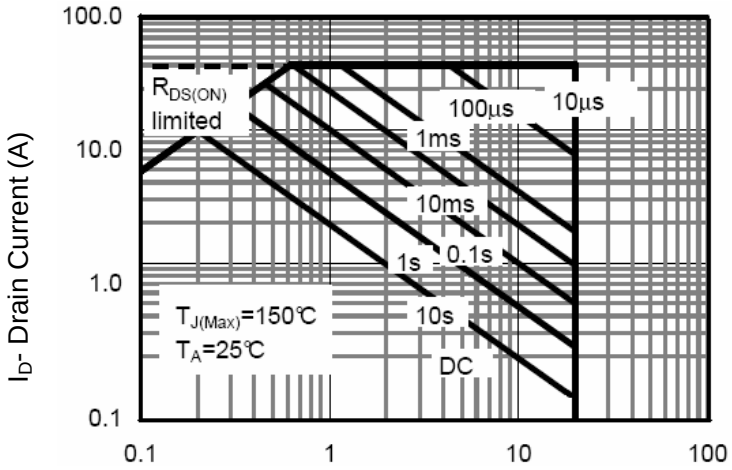


Figure 13 Safe Operation Area

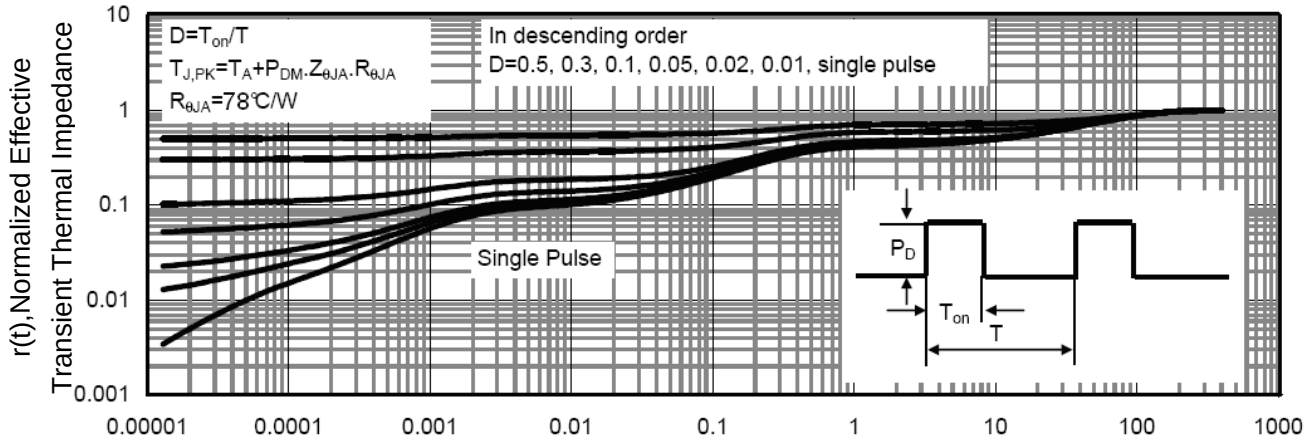
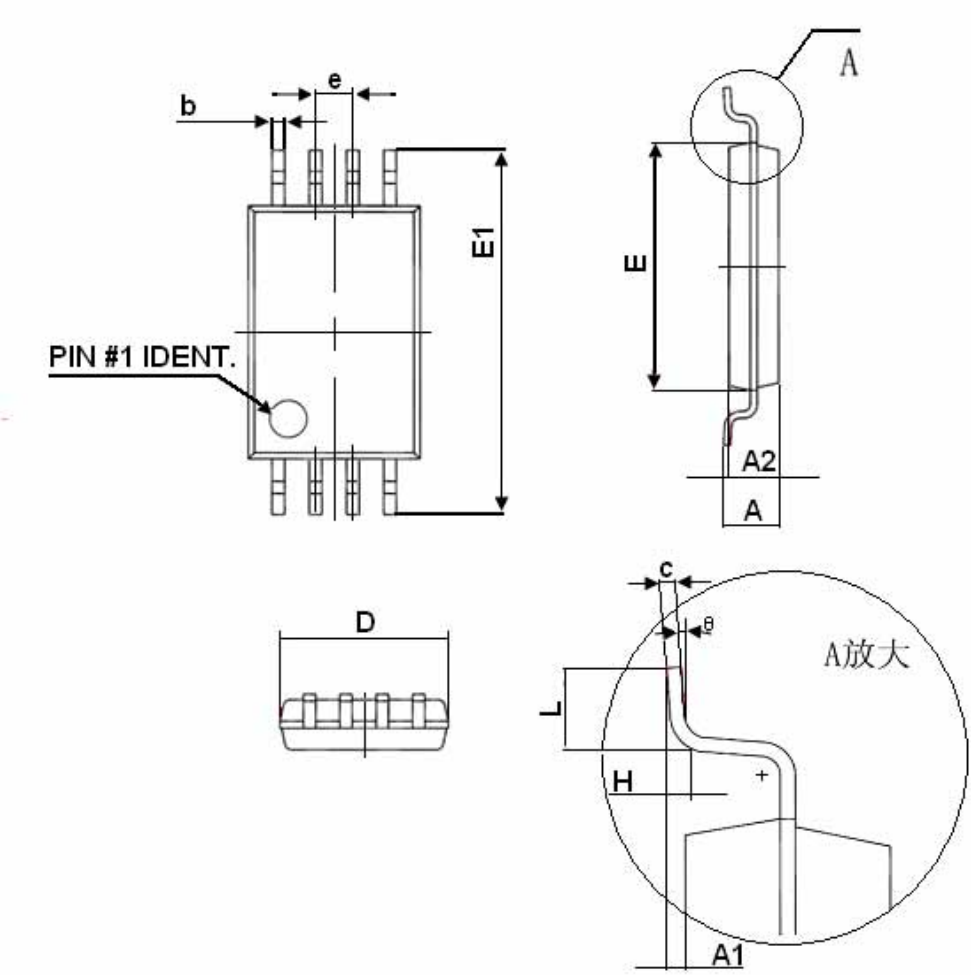


Figure 14 Normalized Maximum Transient Thermal Impedance

TSSOP-8 Package Information



Symbol	Dimensions In Millimeters	
	Min	Max
D	2.900	3.100
E	4.300	4.500
b	0.190	0.300
c	0.090	0.200
E1	6.250	6.550
A		1.100
A2	0.800	1.000
A1	0.020	0.150
e	0.65(BSC)	
L	0.500	0.700
H	0.25(TYP)	
Θ	1°	7°