

CEM7350M

100V/-100V ▲ 85mΩ/210mΩ ▲ N&P Si MOSFET

SILICON Si MOSFET ▲ SMD type

N- and P-channel enhancement mode

UL94V-0 rated flame retardant epoxy

SO8 package ▲ MSL 3

Super high dense cell density for extremely low $R_{DS(ON)}$

High power and current handling capability

MAXIMUM RATINGS

Parameter ($T_A = 25^\circ\text{C}$, unless otherwise noted)		N-Channel	P-Channel
Drain-Source Voltage	V_{DS}	100V	-100V
Gate-Source Voltage	V_{GS}	$\pm 20\text{V}$	$\pm 20\text{V}$
Continuous Drain Current at $T_A = 25^\circ\text{C}$	I_D	3.4A	-2.2A
Pulsed Drain Current ^{Note 1}	I_{DM}	13.6A	-8.8A
Maximum Power Dissipation	P_D	2W	
Operating and Storage Temperature Range	T_J, T_{STG}	-55°C to +150°C	

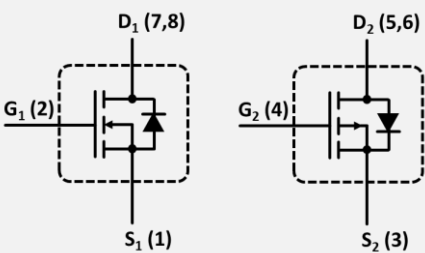
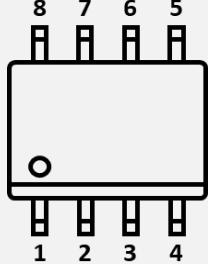
THERMAL CHARACTERISTICS

Parameter	Symbol	Limit
Thermal Resistance, Junction-to-Ambient ^{Note 2}	R_{TH_JA}	62.5°C/W

APPLICATIONS

Audio Amplifier	DC Fan	Industrial Control	Power over Ethernet	Load Switch
				

PIN DESCRIPTION

Circuit Diagram	Outline - Top View	Pin No.	Description
		1 2 3 4 5 6 7 8	Source MOSFET 1 Gate MOSFET 1 Source MOSFET 2 Gate MOSFET 2 Drain MOSFET 2 Drain MOSFET 2 Drain MOSFET 1 Drain MOSFET 1

N-CHANNEL ELECTRICAL CHARACTERISTICS ▲ $T_A = 25^{\circ}\text{C}$, unless otherwise noted

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$	BV_{DSS}	100			V
Zero Gate Voltage Drain Current	$V_{DS} = 100\text{V}, V_{GS} = 0\text{V}$	I_{DSS}			1	μA
Gate Body Leakage Current, Forward	$V_{GS} = 20\text{V}, V_{DS} = 0\text{V}$	I_{GSSF}			100	nA
Gate Body Leakage Current, Reverse	$V_{GS} = -20\text{V}, V_{DS} = 0\text{V}$	I_{GSSR}			-100	nA
On Characteristics ^{Note 3}						
Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	$V_{GS(th)}$	2		4	V
Static Drain-Source On-Resistance	$V_{GS} = 10\text{V}, I_D = 4.1\text{A}$	$R_{DS(ON)}$		85	110	m Ω
Dynamic Characteristics ^{Note 4}						
Input Capacitance	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	C_{ISS}		725		pF
Output Capacitance	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	C_{OSS}		80		pF
Reverse Transfer Capacitance	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	C_{RSS}		45		pF
Switching Characteristics ^{Note 4}						
Turn-On Delay Time	$V_{DD} = 50\text{V}, V_{GS} = 10\text{V}, I_D = 1\text{A}, R_{G(ext)} = 6\Omega$	$t_{D(ON)}$		14		ns
Turn-On Rise Time	$V_{DD} = 50\text{V}, V_{GS} = 10\text{V}, I_D = 1\text{A}, R_{G(ext)} = 6\Omega$	t_R		4		ns
Turn-Off Delay Time	$V_{DD} = 50\text{V}, V_{GS} = 10\text{V}, I_D = 1\text{A}, R_{G(ext)} = 6\Omega$	$t_{D(OFF)}$		27		ns
Turn-Off Fall Time	$V_{DD} = 50\text{V}, V_{GS} = 10\text{V}, I_D = 1\text{A}, R_{G(ext)} = 6\Omega$	t_F		4		ns
Total Gate Charge	$V_{DS} = 80\text{V}, V_{GS} = 10\text{V}, I_D = 2.1\text{A}$	Q_G		15		nC
Gate Source Charge	$V_{DS} = 80\text{V}, V_{GS} = 10\text{V}, I_D = 2.1\text{A}$	Q_{GS}		2.4		nC
Gate Drain Charge	$V_{DS} = 80\text{V}, V_{GS} = 10\text{V}, I_D = 2.1\text{A}$	Q_{GD}		5.1		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Current ^{Note 2}		I_S			1.5	A
Drain-Source Diode Forward Voltage ^{Note 3}	$V_{GS} = 0\text{V}, I_S = 1.5\text{A}$	V_{SD}			1.3	V

Notes

- 1: Repetitive Rating: Pulse width limited by maximum junction temperature
- 2: Surface Mounted on FR4 Board, $t \leq 10$ sec
- 3: Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.
- 4: Guaranteed by design, not subject to production testing.

P-CHANNEL ELECTRICAL CHARACTERISTICS ▲ $T_A = 25^\circ\text{C}$, unless otherwise noted

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	-100			V
Zero Gate Voltage Drain Current	$V_{DS} = -100V, V_{GS} = 0V$	I_{DSS}			-1	μA
Gate Body Leakage Current, Forward	$V_{GS} = 20V, V_{DS} = 0V$	I_{GSSF}			100	nA
Gate Body Leakage Current, Reverse	$V_{GS} = -20V, V_{DS} = 0V$	I_{GSSR}			-100	nA
On Characteristics ^{Note 3}						
Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = -250\mu A$	$V_{GS(th)}$	-2		-4	V
Static Drain-Source On-Resistance	$V_{GS} = -10V, I_D = -1.5A$	$R_{DS(ON)}$		210	270	m Ω
Dynamic Characteristics ^{Note 4}						
Input Capacitance	$V_{DS} = -25V, V_{GS} = 0V, f = 1MHz$	C_{ISS}		725		pF
Output Capacitance	$V_{DS} = -25V, V_{GS} = 0V, f = 1MHz$	C_{OSS}		80		pF
Reverse Transfer Capacitance	$V_{DS} = -25V, V_{GS} = 0V, f = 1MHz$	C_{RSS}		55		pF
Switching Characteristics ^{Note 4}						
Turn-On Delay Time	$V_{DD} = -50V, V_{GS} = -10V, I_D = -1A, R_{G(ext)} = 6\Omega$	$t_{D(ON)}$		13		ns
Turn-On Rise Time	$V_{DD} = -50V, V_{GS} = -10V, I_D = -1A, R_{G(ext)} = 6\Omega$	t_R		5		ns
Turn-Off Delay Time	$V_{DD} = -50V, V_{GS} = -10V, I_D = -1A, R_{G(ext)} = 6\Omega$	$t_{D(OFF)}$		32		ns
Turn-Off Fall Time	$V_{DD} = -50V, V_{GS} = -10V, I_D = -1A, R_{G(ext)} = 6\Omega$	t_F		4		ns
Total Gate Charge	$V_{DS} = -80V, V_{GS} = -10V, I_D = -1.5A$	Q_G		16		nC
Gate Source Charge	$V_{DS} = -80V, V_{GS} = -10V, I_D = -1.5A$	Q_{GS}		2.3		nC
Gate Drain Charge	$V_{DS} = -80V, V_{GS} = -10V, I_D = -1.5A$	Q_{GD}		5.8		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Current ^{Note 2}		I_S			-1.5	A
Drain-Source Diode Forward Voltage ^{Note 3}	$V_{GS} = 0V, I_S = -1.5A$	V_{SD}			-1.3	V

Notes

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

N-CHANNEL REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 1 • Output Characteristics

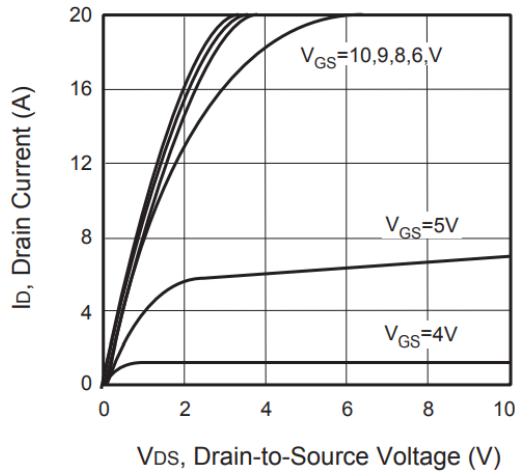


Fig. 2 • Transfer Characteristics

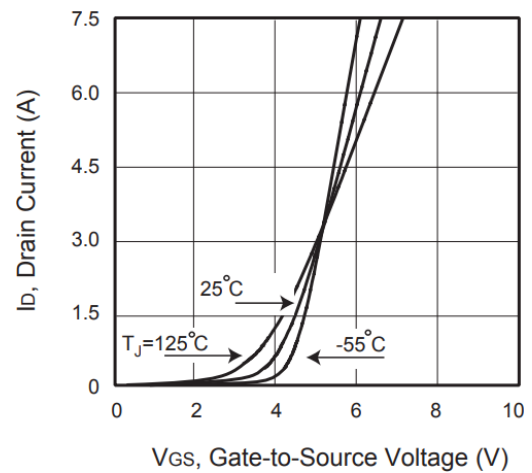


Fig. 3 • Capacitance

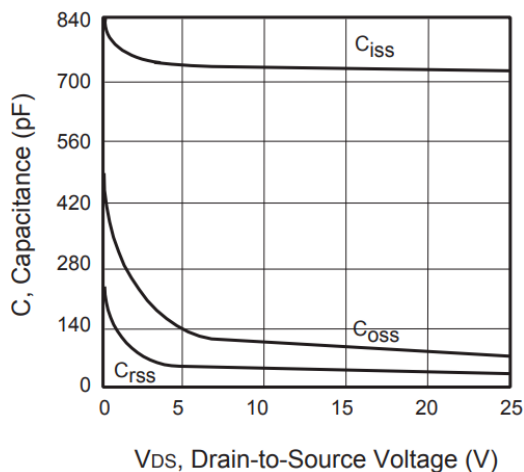


Fig. 4 • On-Resistance Variation with Temperature

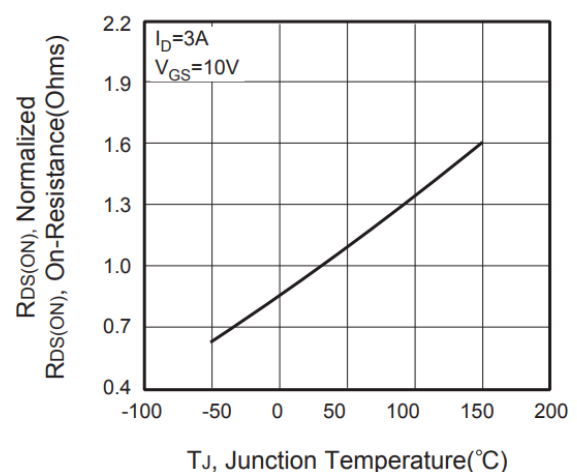


Fig. 5 • Gate Threshold Variation with Temperature

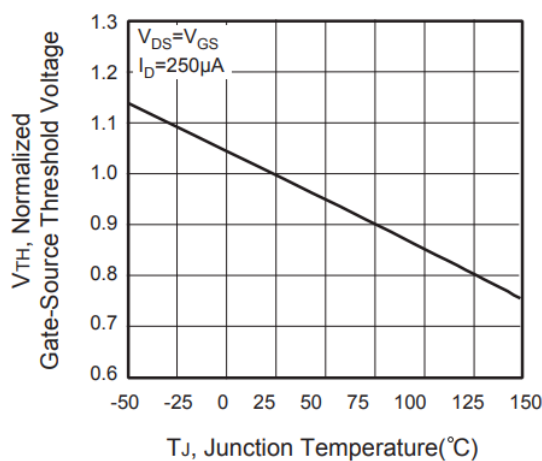
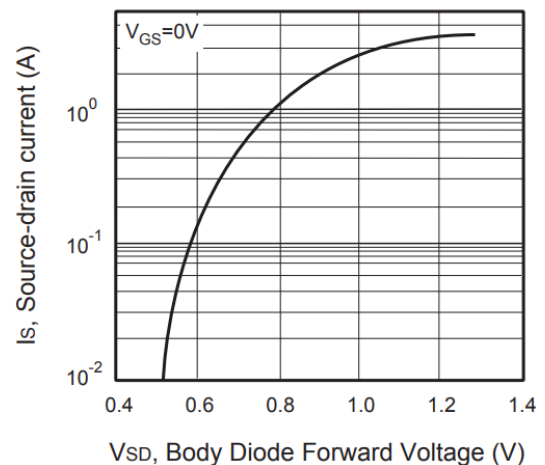


Fig. 6 • Body Diode Forward Voltage Variation with Source Current



P-CHANNEL REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 7 • Output Characteristics

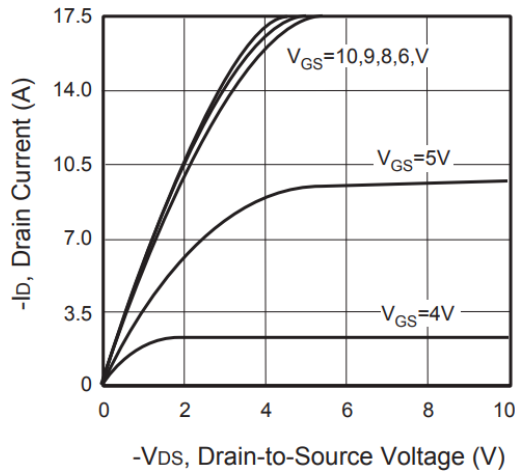


Fig. 8 • Transfer Characteristics

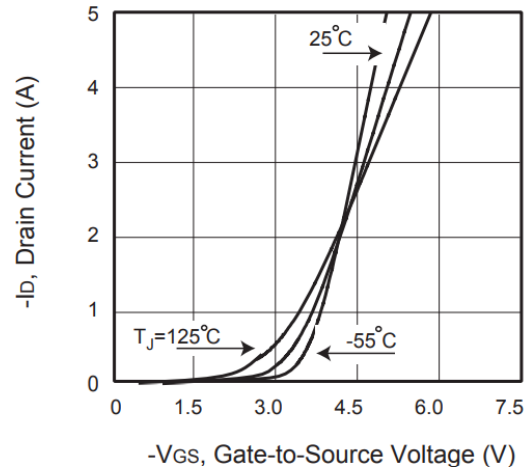


Fig. 9 • Capacitance

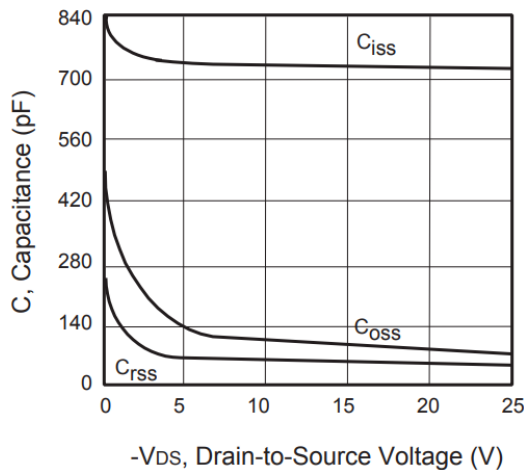


Fig. 10 • On-Resistance Variation with Temperature

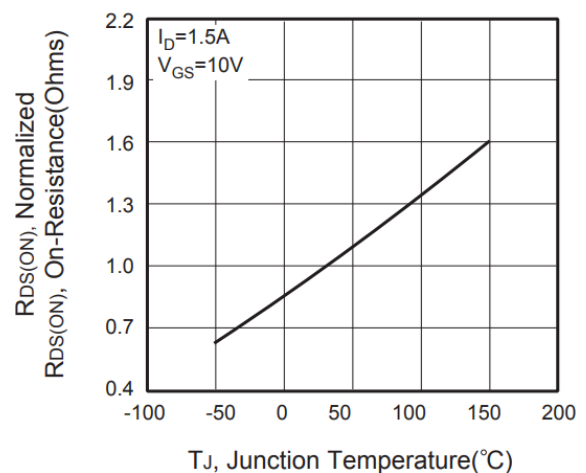


Fig. 11 • Gate Threshold Variation with Temperature

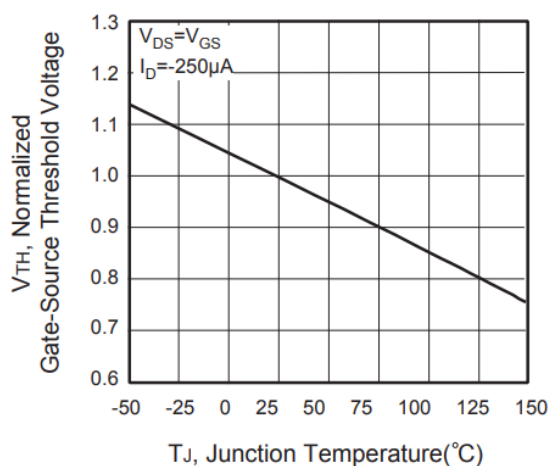
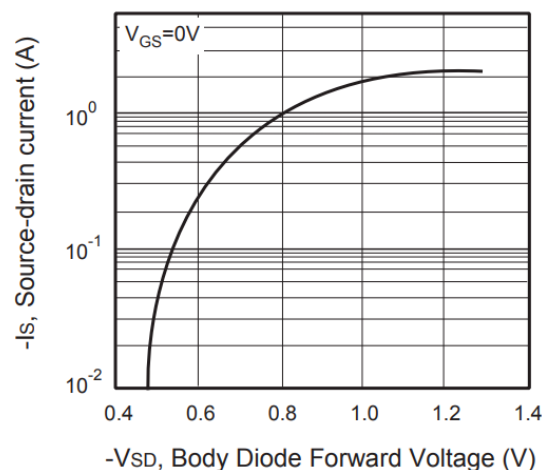


Fig. 12 • Body Diode Forward Voltage Variation with Source Current



N-CHANNEL REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 13 • Gate Charge

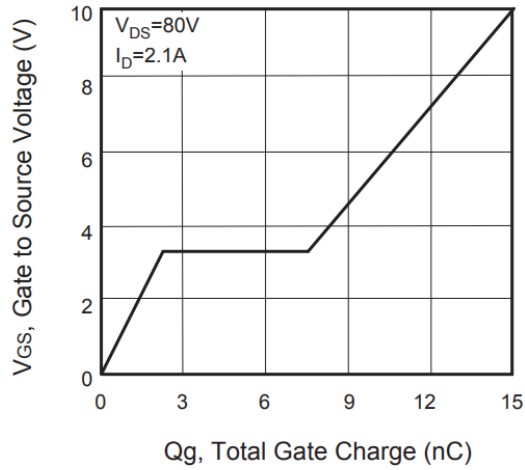
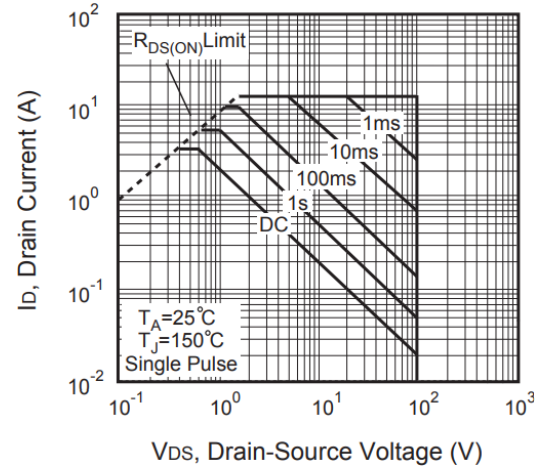


Fig. 14 • Maximum Safe Operating Area



P-CHANNEL ▲ REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 15 • Gate Charge

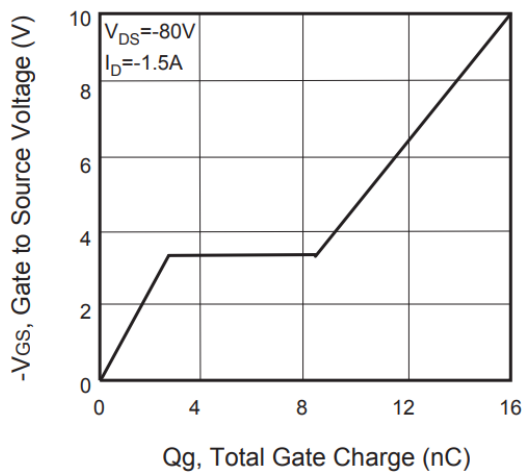
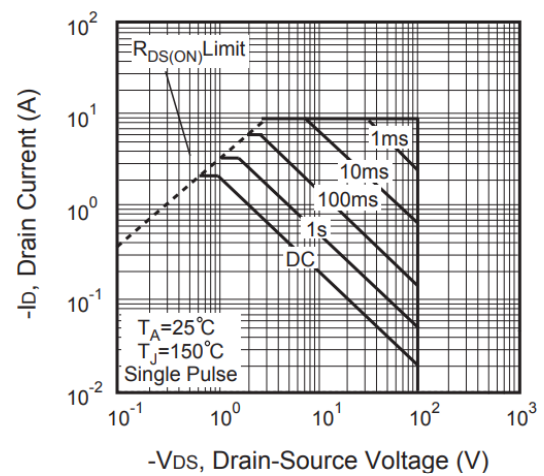


Fig. 16 • Maximum Safe Operating Area



REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 17 • Breakdown Voltage Variation
vs. Temperature

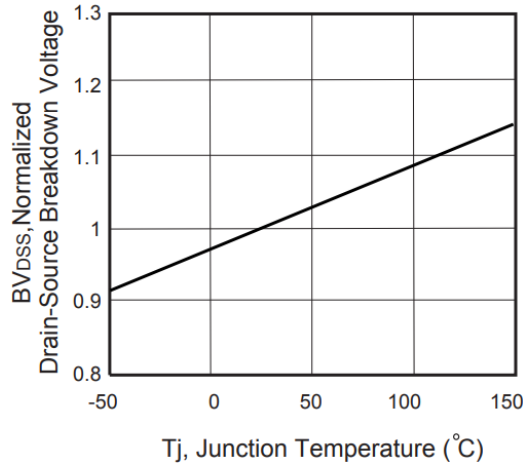


Fig. 18 • Switching Test Circuit

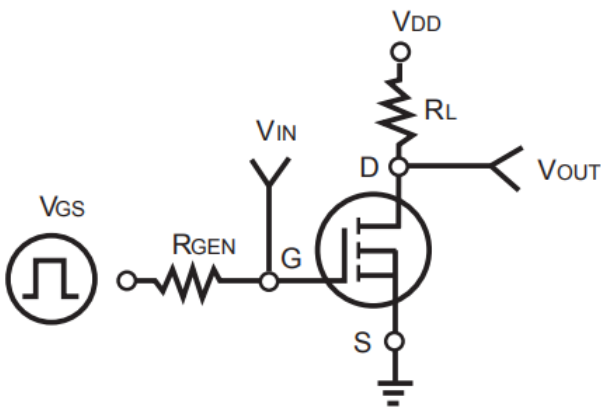


Fig. 19 • Switching Waveforms

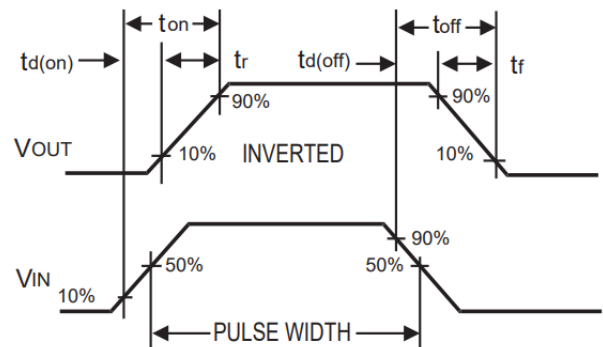
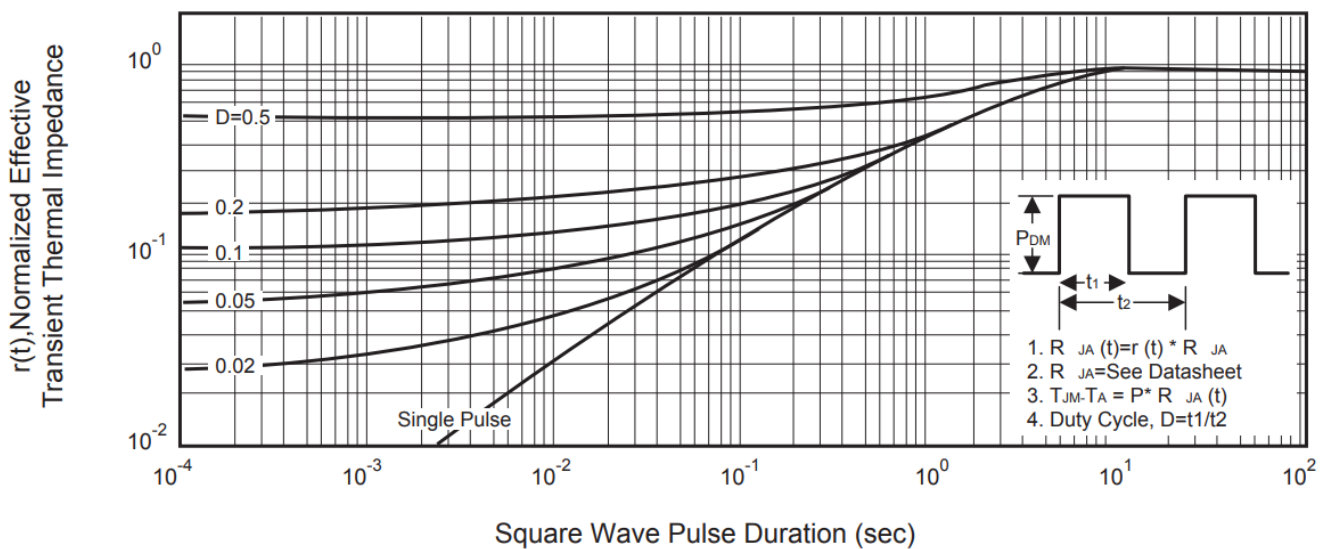
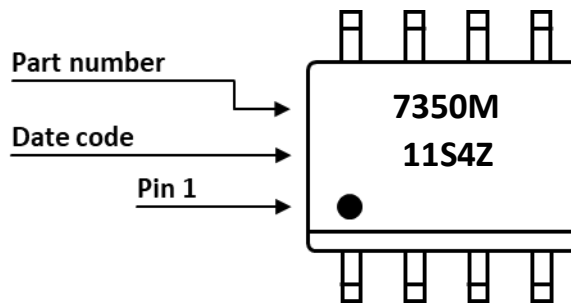


Fig. 20 • Normalized Thermal Transient Impedance Curve

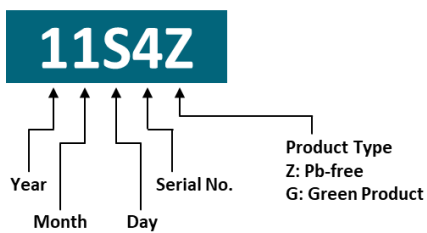


PART MARKING



DATE CODE

Example: 11S4Z



Coding list for „Day“

1	2	3	4	5	6	7	8	9	A
01	02	03	04	05	06	07	08	09	10
B	C	D	E	F	G	H	I	J	K
11	12	13	14	15	16	17	18	19	20
L	M	N	O	P	Q	R	S	T	U
21	22	23	24	25	26	27	28	29	30
V									
31									

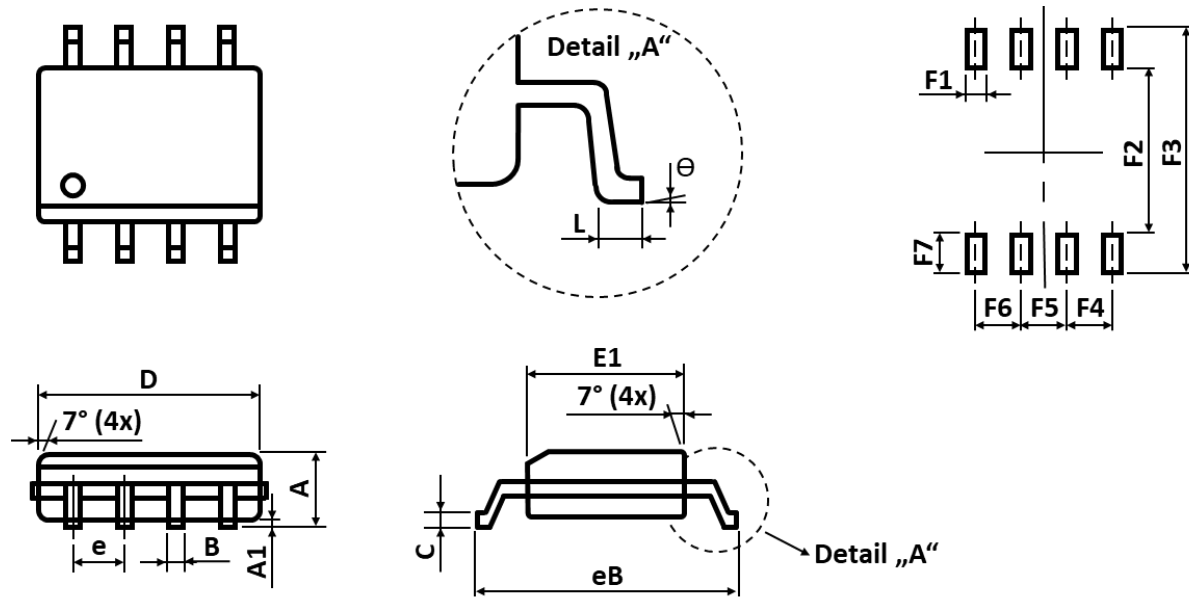
Coding list for „Month“

1	2	3	4	5	6
Jan	Feb	Mar	Apr	May	Jun
7	8	9	A	B	C
Jul	Aug	Sep	Oct	Nov	Dec

Coding list for „Year“

0	1	2	3	4
2020	2021	2022	2023	2024
5	6	7	8	9
2025	2026	2027	2028	2029

PACKAGE OUTLINE AND RECOMMENDED PAD LAYOUT



Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)	Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
A	1.350	-	1.750	E1	3.700		4.060
A1	0.100	-	0.250	eB	5.800		6.200
B	0.310	-	0.510	e		1.270	
C	0.170	-	0.250	L	0.400		0.950
D	4.690	-	5.000	θ	0°	-	8°

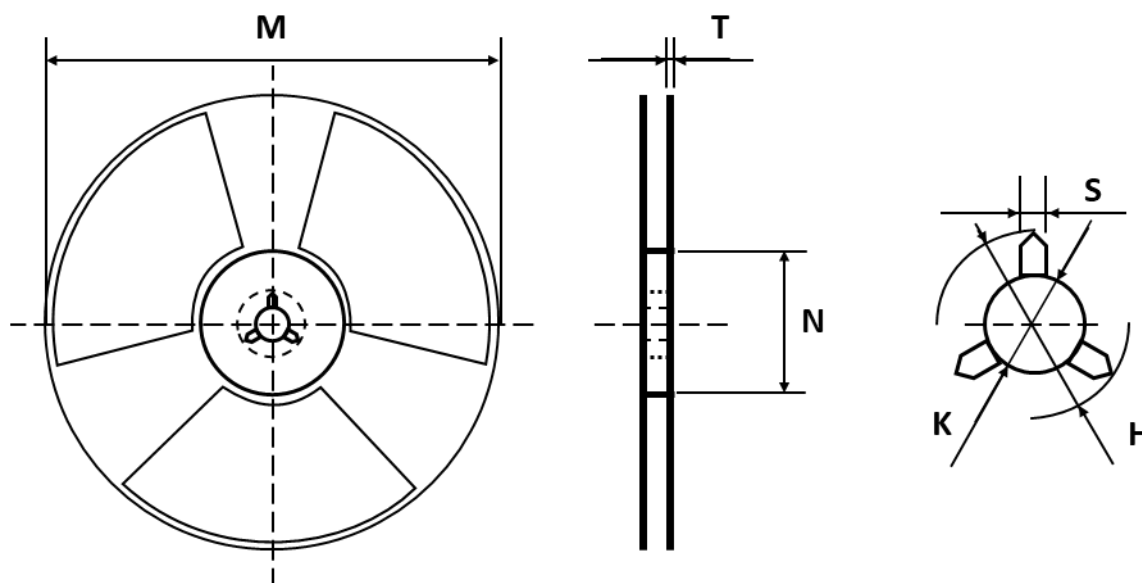
Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)	Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
F1	-	0.500	-	F5	-	1.270	-
F2	-	4.250	-	F6	-	1.270	-
F3	-	6.250	-	F7	-	1.000	-
F4	-	1.270	-				

Notes: 1. The suggested land pattern dimensions have been provided for reference only.
2. For further information, please reference document IPC-7351A.

ORDERING INFORMATION

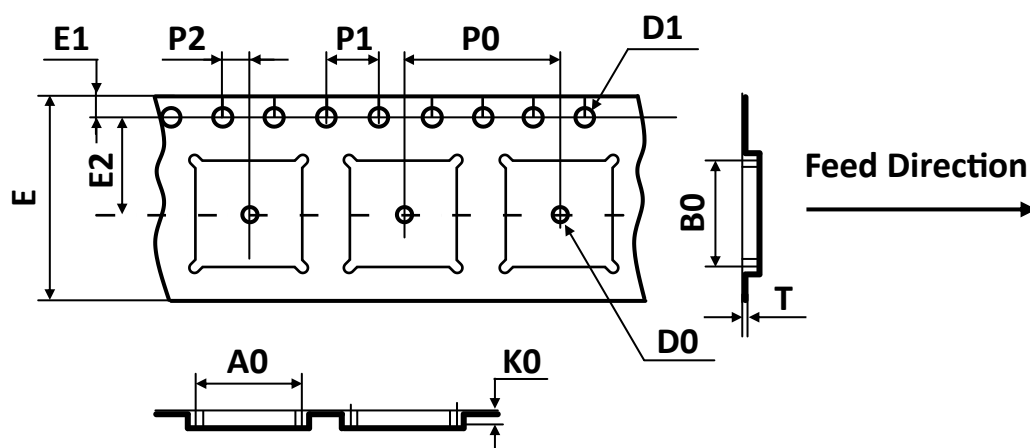
Part Number	Package	Packing	Reel Qty.	Inner Box Qty.	Outer Box Qty.
CEM7350M	SO8	13" Reel	2,500pcs	5,000pcs	40,000pcs

REEL DIMENSIONS ▲ All dimensions in mm



Tape Size	Reel Size	M	N	T	H	K	S
12mm	Ø330	Ø330.00 ±2.00	Ø100.00 ±0.50	2.20 ±0.20	20.00 ±1.00	13.20 ±0.20	3.00 ±1.00

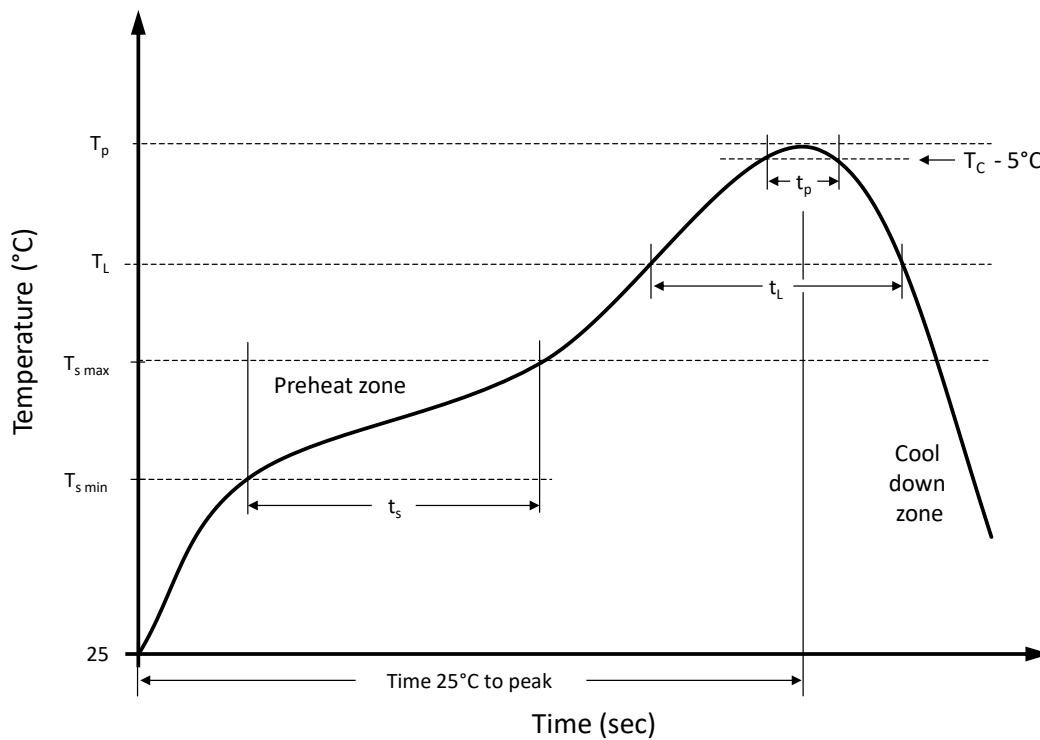
TAPE DIMENSIONS ▲ All dimensions in mm



Package	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
SO8	6.50 ±0.10	5.30 ±0.10	2.05 ±0.15	1.50 ±0.10	1.50 ±0.10	12.00 ±0.10	1.75 ±0.10	5.50 ±0.10	8.00 ±0.10	4.00 ±0.10	2.00 ±0.05	0.25 ±0.02

Note: All dimensions meet EIA-481-D requirements.

RECOMMENDED REFLOW SOLDERING PROFILE



Recommended reflow soldering conditions ▲ Refer to JEDEC J-STD-020E

Profile Features		Sn-Pb Eutetic Assembly	Pb-Free Assembly
Preheat temperature min.	$T_{s \min}$	100 °C	150 °C
Preheat temperature max.	$T_{s \max}$	150 °C	200 °C
Preheat time t_s from $T_{s \min}$ to $T_{s \max}$	t_s	120 seconds	120 seconds
Ramp-up rate (T_L to T_p)		max. 3 °C/second	max. 3 °C/second
Liquidous temperature	T_L	183 °C	217 °C
Time t_L maintained above T_L	t_L	150 seconds max.	150 seconds max.
Peak package body temperature	T_p	235°C	260°C
Timeframe of within 5°C below and up to max actual peak body temperature	t_p	20 seconds max.	30 seconds max.
Ramp-down rate (T_L to T_p)		max. 6 °C/second	max. 6 °C/second
Time 25°C to peak temperature		max. 6 minutes	max. 8 minutes

REVISION TABLE

Revision	Date	Status	Notes
001	30/09/2022	Initial release	Initial publication

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It is subject to the user's duty of care to design and validate his products in such a way that appropriate measures are taken, such as protective circuits or redundant systems to ensure the safety standards required in the application.

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