MT3205B

N-Channel Power MOSFET
60V, 140A, 3.0mΩ

MT Semiconductor®

http://www.mtsemi.com

General Description

This N-channel MOSFET is produced using MOS-TECH Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

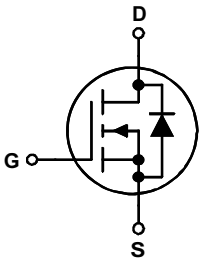
Features

- $R_{DS(on)}$ = 3.0mΩ(Typ.)@ V_{GS}= 10V, I_D= 100A
- High performance trench technology for extremely low $R_{DS(ON)}$
- High power and current handling capability
- RoHS compliant

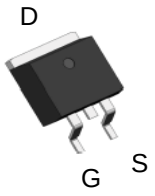
Applications

- DC/DC converters

Simplified Schematic



MARKING DIAGRAM & PIN ASSIGNMENT



TO-263-2L

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

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain to Source Voltage		60	V
V_{GSS}	Gate to Source Voltage		±20	V
I_D	Drain Current	-Continuous (T_C = 25°C) (Note 1)	140	A
I_{DM}	Drain Current	- Pulsed	470	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	397	mJ
P_D	Power Dissipation	(T_C = 25°C)	250	W
		- Derate above 25°C	1.0	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +175	°C

Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.65	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	35	

Electrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V, T_J = 25	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 44V, V_{GS} = 0V	-	-	25	μA
		V_{DS} = 44V, T_C = 150°C	-	-	250	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	VGS = VDS, ID = 250μA	2		4	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 100A	-	3.0	4.5	mΩ
		V_{GS} = 10V, I_D = 56A, T_J = 175°C	-	10	-	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	-	3520	4360	pF
C_{oss}	Output Capacitance		-	550	760	pF
C_{rss}	Reverse Transfer Capacitance		-	340	470	pF
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	3	4	5	Ω
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{GS} = 0V to 10V; V_{DS} = 44V, I_D = 59A, I_g = 1mA	-	121	145	nC
$Q_{g(th)}$	Threshold Gate Charge	V_{GS} = 0V to 2V; V_{DS} = 44V, I_D = 59A, I_g = 1mA	-	35	46	nC
Q_{gs}	Gate to Source Gate Charge	V_{DS} = 44V, I_D = 59A, I_g = 1mA	-	45	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau	V_{DS} = 44V, I_D = 59A, I_g = 1mA		18	-	nC
Q_{gd}	Gate to Drain “Miller” Charge	V_{DS} = 44V, I_D = 59A, I_g = 1mA	-	39	-	nC
Switching Characteristics						
t_{ON}	Turn-On Time	V_{DD} = 28V, I_D = 59A, V_{GS} = 10V, R_{GEN} = 2.5Ω	-	99	137	ns
$t_{d(on)}$	Turn-On Delay Time		-	19	38	ns
t_r	Turn-On Rise Time		-	127	251	ns
$t_{d(off)}$	Turn-Off Delay Time		-	47	73	ns
t_f	Turn-Off Fall Time		-	19	49	ns
t_{OFF}	Turn-Off Time		-	67	89	ns
Drain-Source Diode Characteristics						
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 59A	-	-	1.2	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 59A, dI_F/dt = 100A/μs	-	49	-	ns
Q_{rr}	Reverse Recovery Charge		-	78	-	nC

Notes:
1: Calculated continuous current based on maximum allowable junction temperature. Package limited to 75A continuous, see Figure 9.
2: L = 0.21mH, I_{AS} = 59A, V_{DD} = 50V, V_{GS} = 10V, R_G = 25Ω, Starting T_J = 25°C

Typical Performance Characteristics

Figure 1. On-Region Characteristics

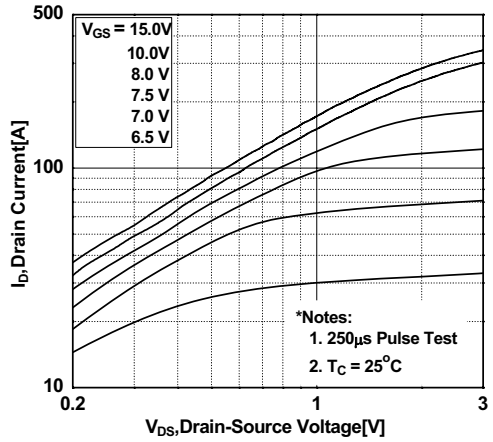


Figure 2. Transfer Characteristics

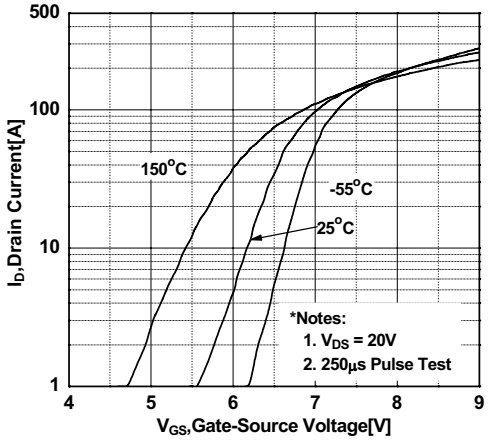


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

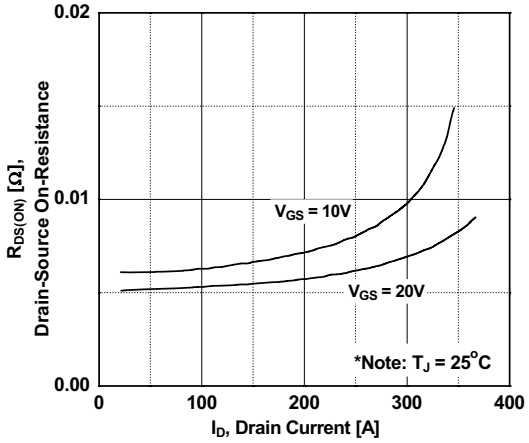


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

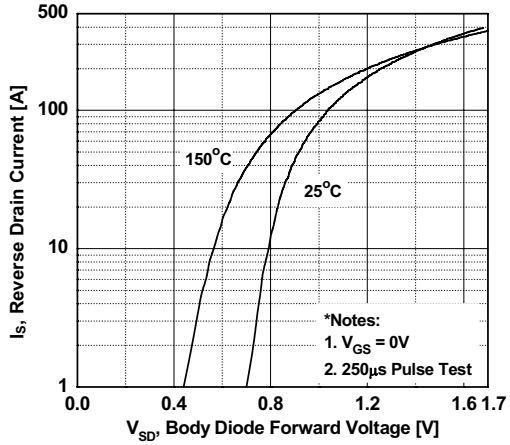


Figure 5. Capacitance Characteristics

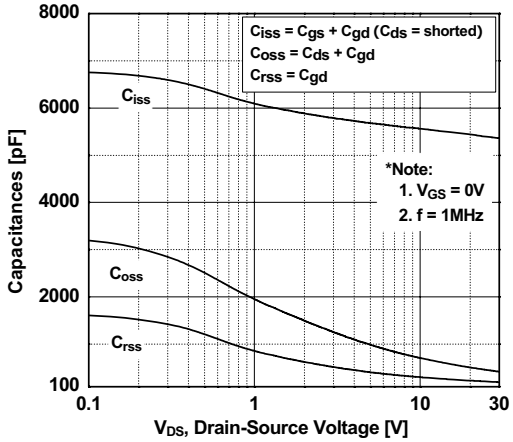
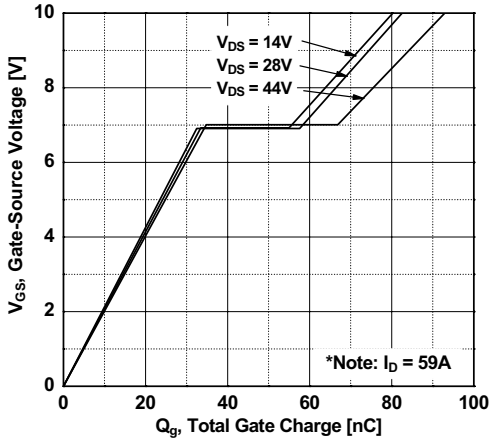


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

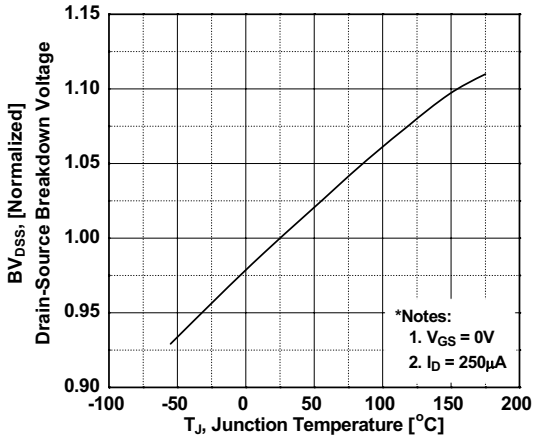


Figure 8. On-Resistance Variation vs. Temperature

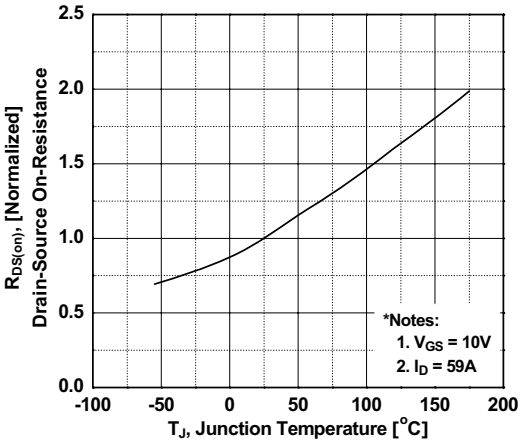


Figure 9. Maximum Safe Operating Area

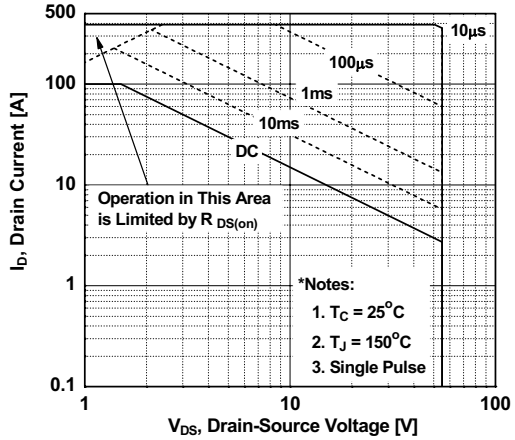


Figure 10. Maximum Drain Current vs. Case Temperature

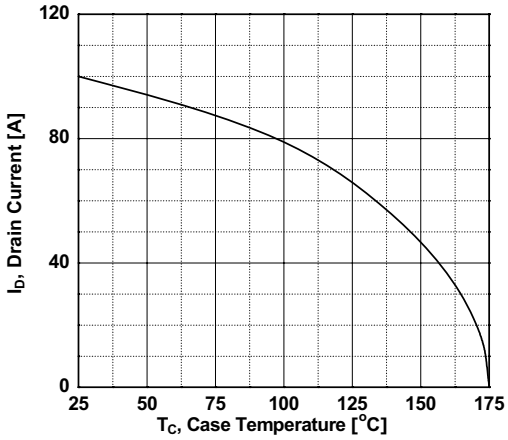
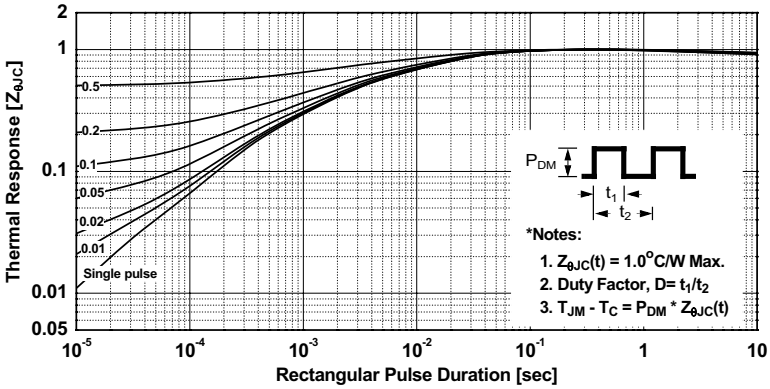
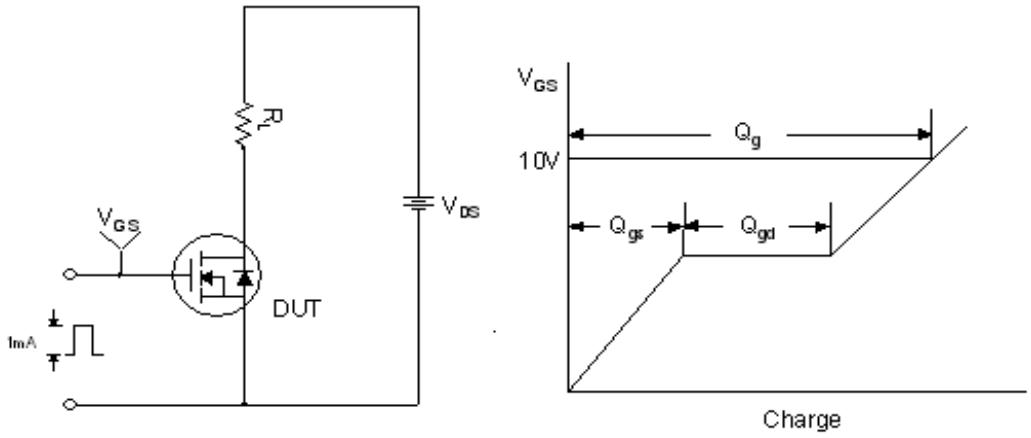


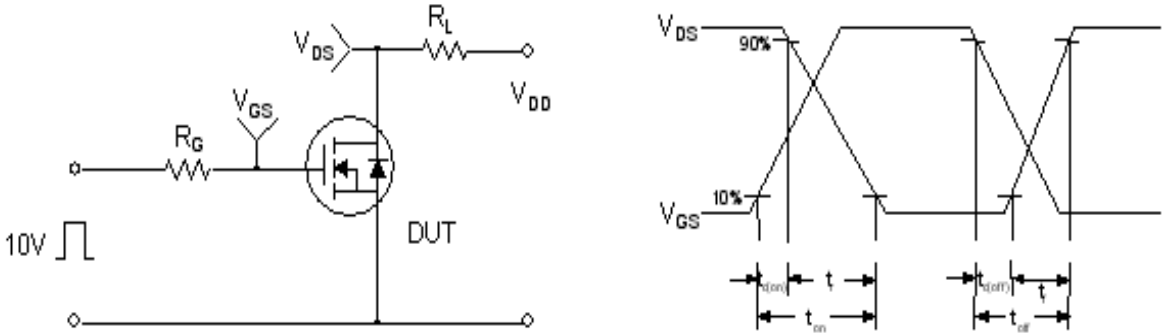
Figure 11. Transient Thermal Response Curve



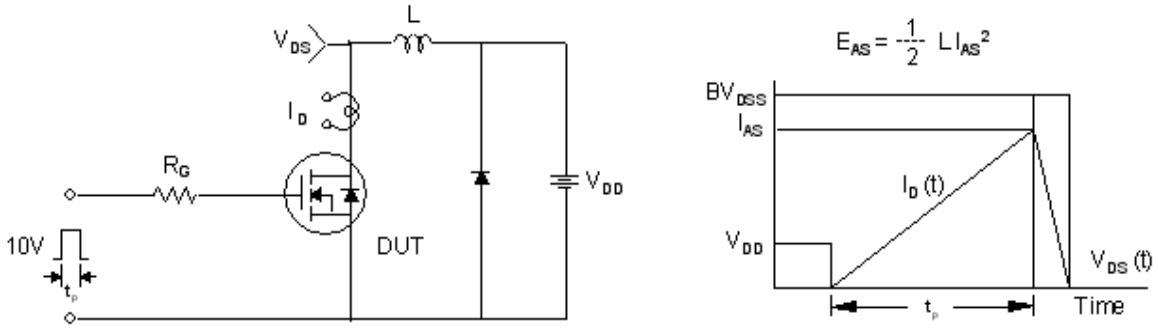
Gate Charge Test Circuit & Waveform



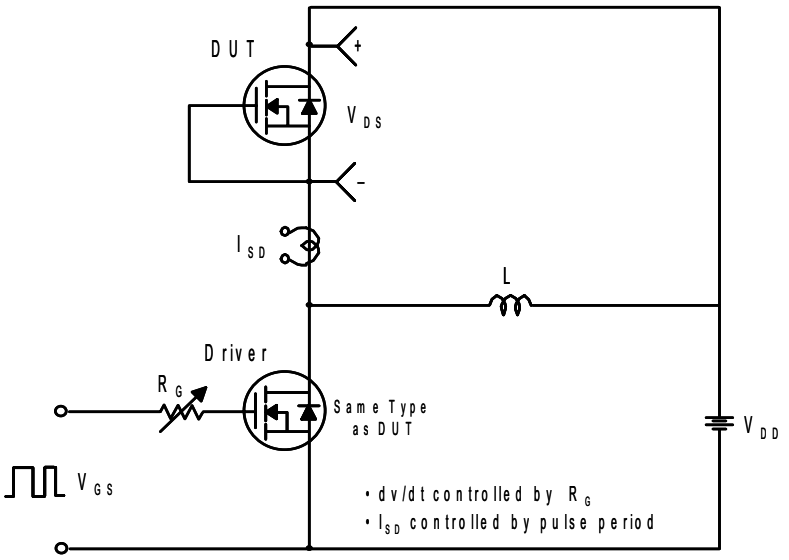
Resistive Switching Test Circuit & Waveforms

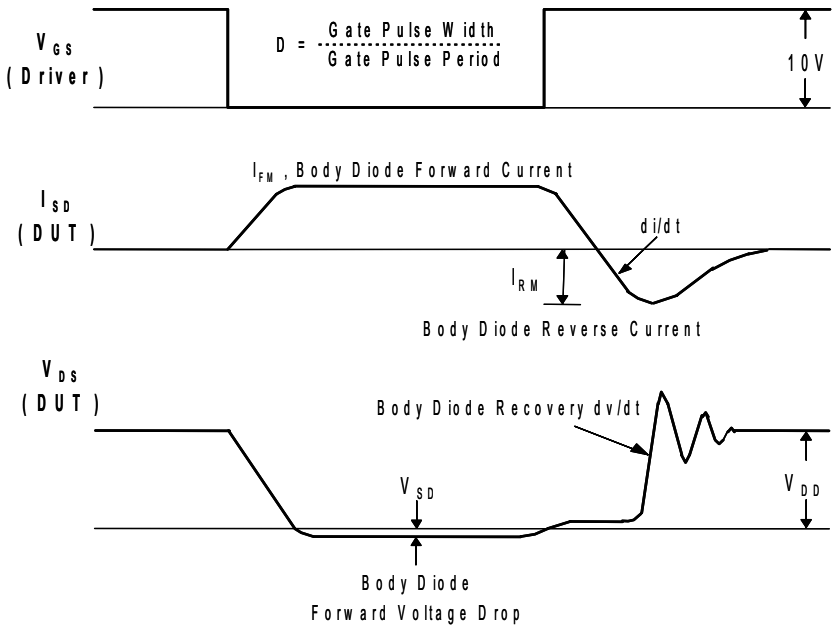


Unclamped Inductive Switching Test Circuit & Waveforms

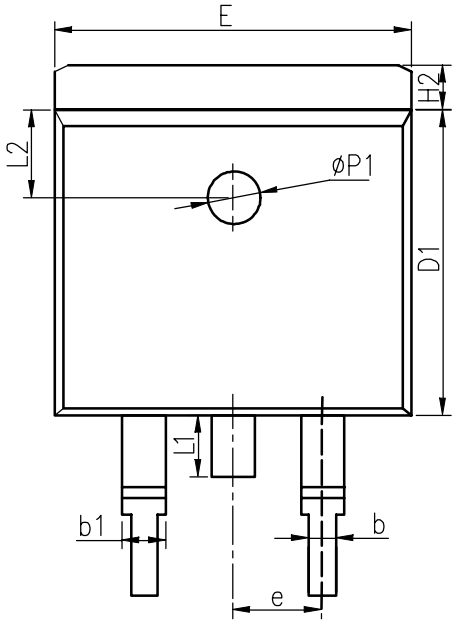


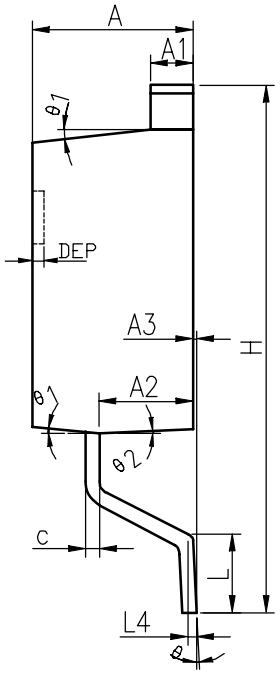
Peak Diode Recovery dv/dt Test Circuit & Waveforms

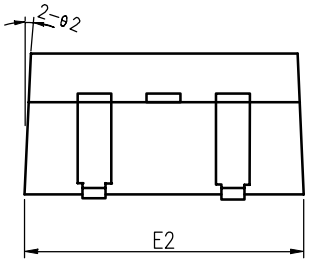




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COMMON DIMENSIONS

SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.57	4.70	0.173	0.180	0.185
A1	1.22	1.27	1.32	0.048	0.050	0.052
A2	2.59	2.69	2.79	0.102	0.106	0.110
A3	0.00	0.10	0.20	0.000	0.004	0.008
b	0.77	0.813	0.90	0.030	0.032	0.035
b1	1.20	1.270	1.36	0.047	0.050	0.054
c	0.34	0.381	0.47	0.013	0.015	0.019
D1	8.60	8.70	8.80	0.339	0.343	0.346
E	10.00	10.16	10.26	0.394	0.400	0.404
E2	10.00	10.10	10.20	0.394	0.398	0.402
e		2.54 BSC			0.100 BSC	
H	14.70	15.10	15.50	0.579	0.594	0.610
H2	1.17	1.27	1.40	0.046	0.050	0.055
L	2.00	2.30	2.60	0.079	0.091	0.102
L1	1.45	1.55	1.70	0.057	0.061	0.067
L2		2.50 REF			0.098 REF	
L4		0.25 BSC			0.010 BSC	
	0°	5°	8°	0°	5°	8°
1	5°	7°	9°	5°	7°	9°
2	1°	3°	5°	1°	3°	5°
ΦP1	1.40	1.50	1.60	0.055	0.059	0.063
DEP	0.05	0.10	0.20	0.002	0.004	0.008

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Keep safety first in your circuit designs!

1. MOS-TECH Semiconductor Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.
   Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.