

# MSKSEMI

SEMICONDUCTOR



ESD



TVS



TSS



MOV



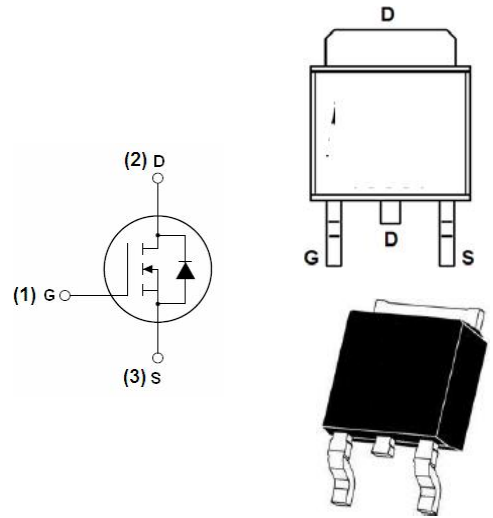
GDT



PLED

Product data sheet

**Schematic diagram**



TO-252

**Features**

- $V_{DS} = 30V, I_D = 90A$
- $R_{DS(ON)}, 3.5m\Omega$  (Typ) @  $V_{GS} = 10V$
- $R_{DS(ON)}, 7m\Omega$  (Typ) @  $V_{GS} = 4.5V$
- Low on resistance
- Low gate charge
- Fast switching
- Low reverse transfer capacitances

**Application**

- DC-DC converters
- Synchronous Rectifier

**Absolute Maximum Ratings(TA=25°C unless otherwise noted)**

Parameter		Symbol	Value	Unit
Drain-Source Voltage		$V_{DS}$	30	V
Gate-Source Voltage		$V_{GS}$	±20	V
Drain Current-Continuous <sup>Note3</sup>	TC=25°C	$I_D$	90	A
	TC=100°C		63	A
Drain Current-Pulsed <sup>Note1</sup>		$I_{DM}$	200	A
Avalanche Energy <sup>Note4</sup>		$E_{AS}$	280	mJ
Avalanche Current		$I_{AS}$	33	A
Maximum Power Dissipation	TC=25°C	$P_D$	105	W
Storage Temperature Range		$T_{STG}$	-55 to +150	°C
Operating Junction Temperature Range		$T_J$	-55 to +150	°C

**Thermal Resistance**

Parameter	Symbol	Min.	Typ.	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	-	3.3	-	°C/W

**Electrical Characteristics(T<sub>J</sub>=25°C unless otherwise noted)**

OFF CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>DS</sub> =250uA	30	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	-	-	1	uA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA

ON CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250uA	1.0	1.7	2.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>DS</sub> =30A	-	3.5	5.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>DS</sub> =20A	-	7	8.9	

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> = 0V, f=1MHz	-	1963	-	pF
Output Capacitance	C <sub>OSS</sub>		-	248	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	221	-	
Gate Resisitance	R <sub>g</sub>	V <sub>DD</sub> =0V, V <sub>GS</sub> =1V, F=1MHz	-	1.43	-	Ω

SWITCHING CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	T <sub>d(on)</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>GEN</sub> =3Ω I <sub>D</sub> =20A	-	55	-	ns
Rise Time	t <sub>r</sub>		-	36.4	-	
Turn-Off Delay Time	T <sub>d(off)</sub>		-	37.5	-	
Fall Time	t <sub>f</sub>		-	14	-	
Total Gate Charge at 10V	Q <sub>g</sub>	V <sub>DS</sub> =15V, I <sub>DS</sub> =45A, V <sub>GS</sub> =10V	-	41	-	nC
Gate to Source Gate Charge	Q <sub>gs</sub>		-	6.4	-	
Gate to Drain"Miller"Charge	Q <sub>gd</sub>		-	11	-	

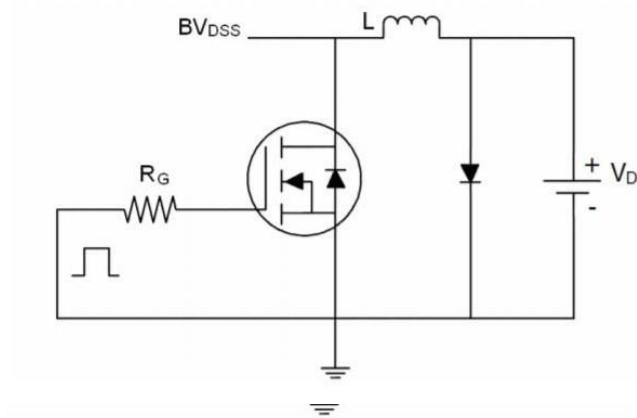
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>DS</sub> =20A	-	-	1.2	V
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> =25°C, I <sub>F</sub> =20A	-	21.7	-	nS
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt=100A/us	-	7.2	-	nC

**Notes:**

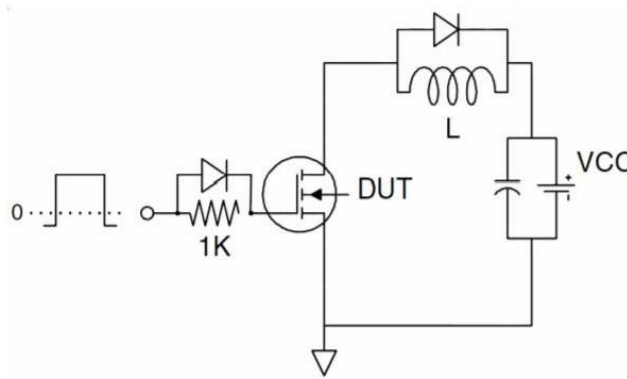
- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board, t<sub>s</sub>≤10sec.
- 3: Pulse width ≤ 300μs, duty cycle ≤ 2%.
- 4: EAS condition: L=0.5mH, V<sub>DD</sub>=15V, V<sub>G</sub>=10V, V<sub>GATE</sub>=30V, Start T<sub>J</sub>=25°C.

## Test Circuit

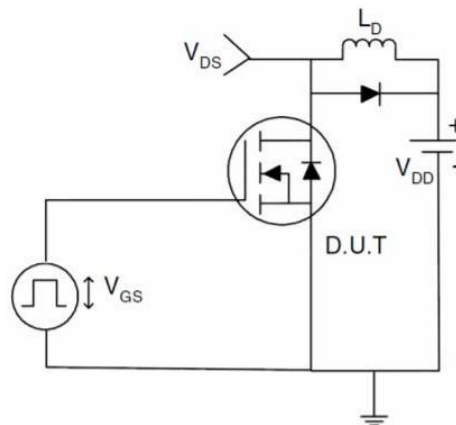
### 1) E<sub>AS</sub> Test Circuit



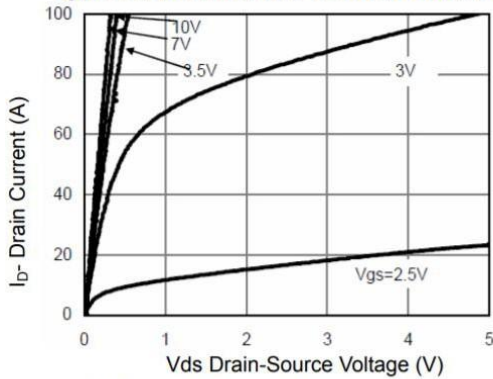
### 2) Gate Charge Test Circuit



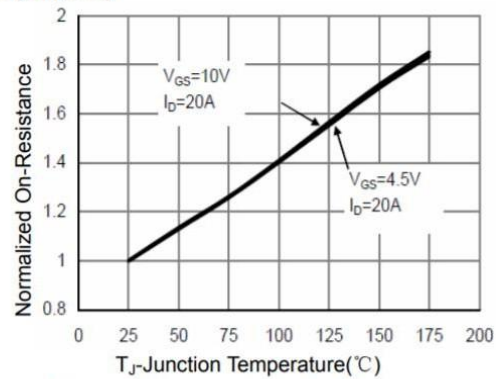
### 3) Switch Time Test Circuit



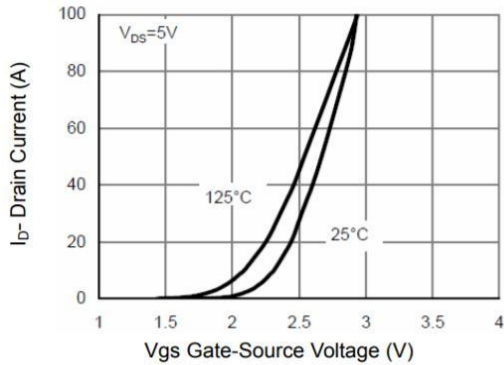
**Typical Electrical and Thermal Characteristics (Curves)**



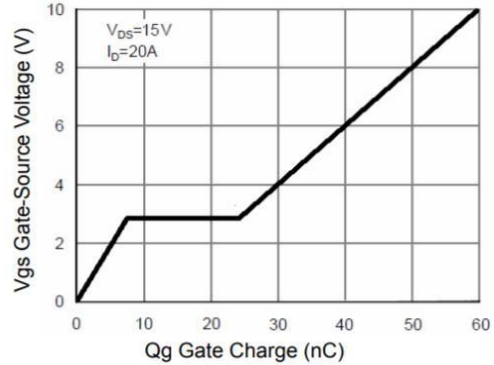
**Figure 1 Output Characteristics**



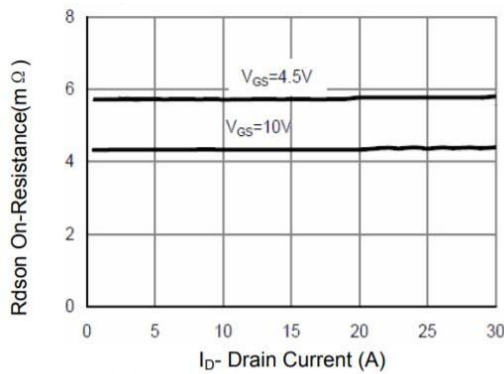
**Figure 4 Rds(on)-Junction Temperature**



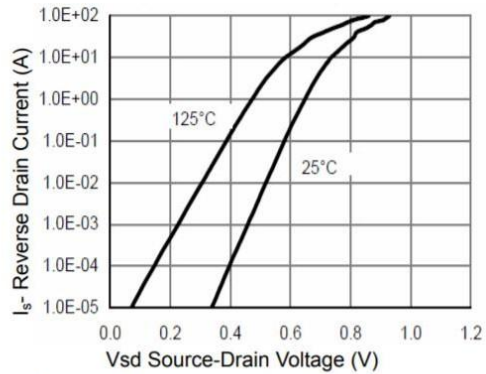
**Figure 2 Transfer Characteristics**



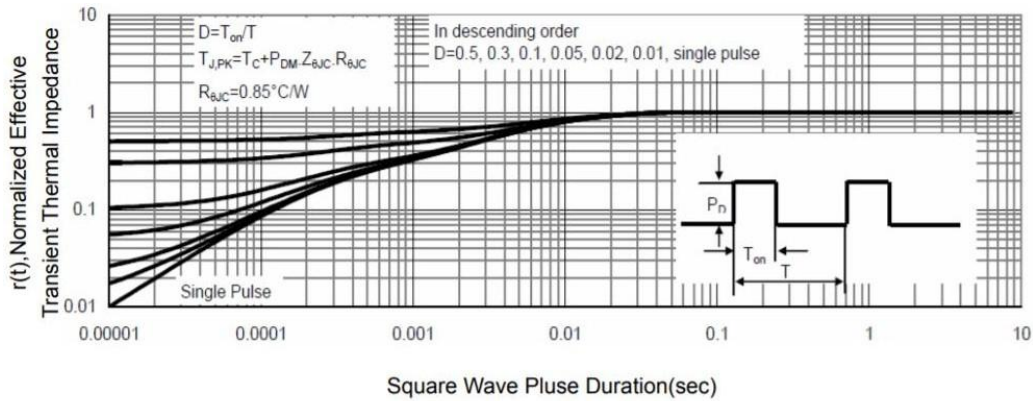
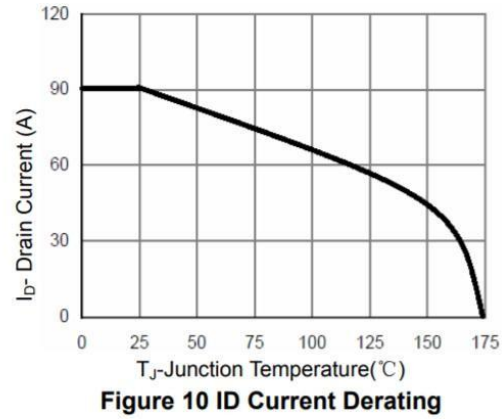
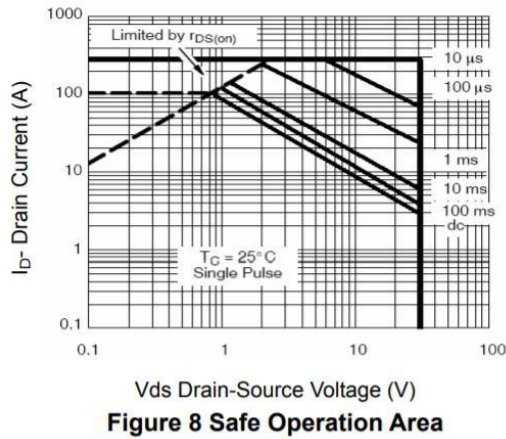
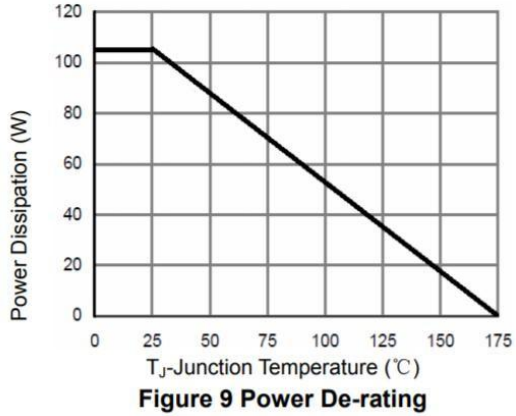
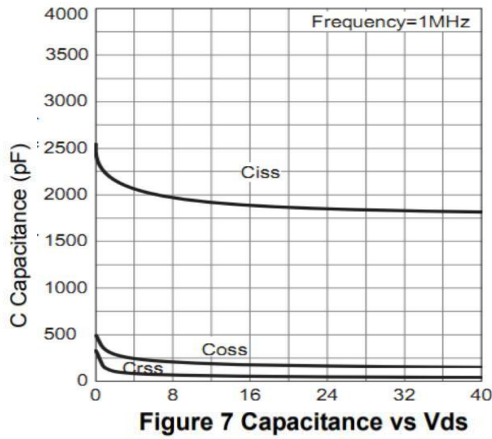
**Figure 5 Gate Charge**



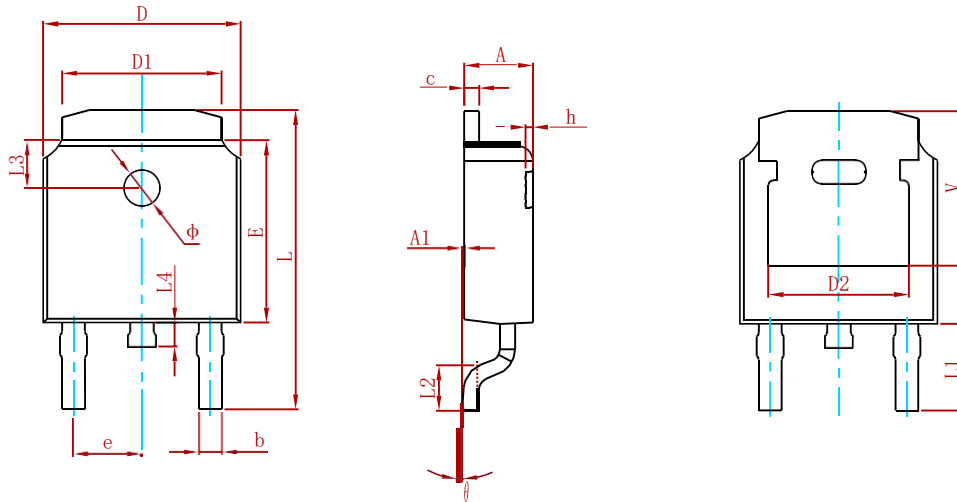
**Figure 3 Rds(on)-Drain Current**



**Figure 6 Source-Drain Diode Forward**

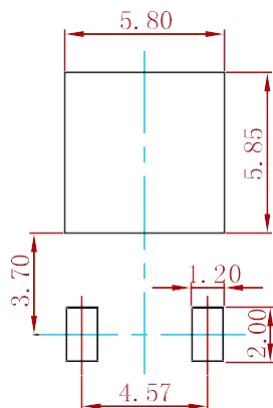


**PACKAGE MECHANICAL DATA**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	

**Suggested Pad Layout**



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: ± 0.05mm.
3. The pad layout is for reference purposes only.

**REEL SPECIFICATION**

P/N	PKG	QTY
MS100N03	TO-252	2500

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