



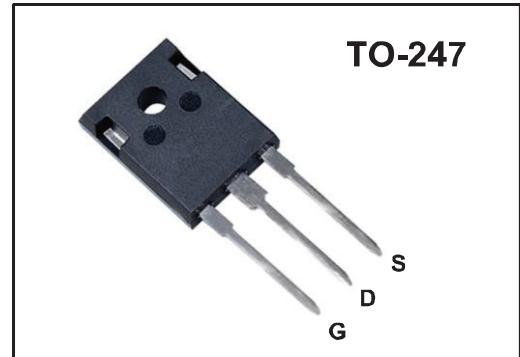
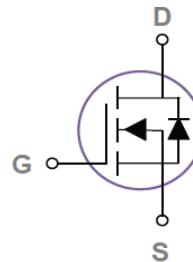
DACO SEMICONDUCTOR CO., LTD.

DAMJ53N650P

## N-Channel Enhancement Mode MOSFET

### Features

- ◆  $V_{DSS} = 650V$
- ◆  $R_{DS(ON)}$  Typ.  $60m\Omega$  @  $V_{GS} = 10V$
- ◆ High ruggedness performance
- ◆ Super-Junction technology
- ◆ Pb Free & RoHS Compliant

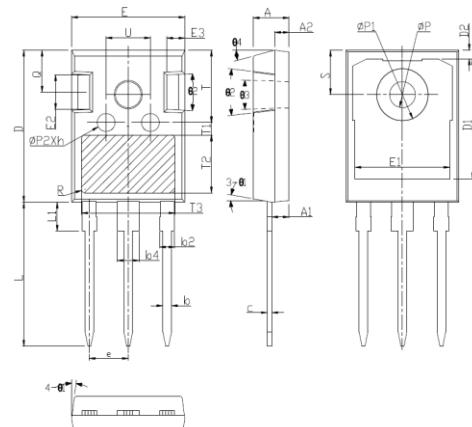


### Applications

- ◆ Backlighting
- ◆ Power Converters
- ◆ Synchronous Rectifiers

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

Parameter	Symbol	Ratings	Unit
Drain Source Voltage	$V_{DS}$	650	V
Gate Source Voltage	$V_{GS}$	$\pm 30$	V
Drain Current Continuous @ $T_c = 25^\circ C$ @ $T_c = 100^\circ C$	$I_D$	53 33.5	A
Drain Current Pulsed@ $T_c = 25^\circ C$	$I_{DM}$	212	A
Single Pulse Avalanche Energy	$E_{AS}$	344	mJ
Single Pulse Avalanche Current	$I_{AS}$	8.3	A
Maximum Power Dissipation	$P_D$	390	W
Storage Temperature Range	$T_{STG}$	-55 to +150	°C
Operating Junction Temperature Range	$T_J$	-55 to +150	°C
Thermal Resistance Junction to Case <small>Note3</small>	$R_{θJC}$	0.32	°C/W



Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	Min	Nom	Max		Min	Nom	Max
A	4.75	5.00	5.25	L	19.52	19.92	20.32
A1	2.16	2.41	2.66	L1	—	—	4.30
A2	1.85	2.00	2.15	ΦP	3.35	3.60	3.85
b	1.11	1.20	1.35	ΦP1	—	—	7.30
b2	1.90	2.01	2.25	ΦP2	2.25	2.50	2.75
b4	2.90	3.10	3.25	Q	5.50	5.80	6.10
c	0.51	0.61	0.75	S	6.15BSC		
D	20.60	21.00	21.40	R	0.50REF		
D1	16.15	16.55	16.95	T	9.70	—	10.30
D2	1.00	1.20	1.40	T1	1.65REF		
E	15.50	15.80	16.10	T2	8.00REF		
E1	13.00	13.30	13.60	T3	12.80REF		
E2	4.70	5.00	5.30	U	5.90	—	6.50
E3	2.25	2.50	2.75	θ1	3°	7°	10°
e	5.44BSC			θ2	2°	5°	8°
h	0.00	0.10	0.25	θ3	1°	—	2°
				θ4	10°	15°	20°



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**Electrical Characteristics @  $T_J=25^\circ\text{C}$  (unless otherwise specified)**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>OFF Characteristics</b>						
Drain-Source Breakdown Voltage	$\text{BV}_{\text{DSS}}$	$\text{V}_{\text{GS}}=0\text{V}$ , $\text{I}_{\text{DS}}=1\text{mA}$	650	-	-	V
Zero Gate Voltage Drain Current	$\text{I}_{\text{DS}}$	$\text{V}_{\text{GS}}=0\text{V}$ , $\text{V}_{\text{DS}}=650\text{V}$	-	-	10	uA
Gate-Body Leakage	$\text{I}_{\text{GSS}}$	$\text{V}_{\text{GS}}=\pm 30\text{V}$ , $\text{V}_{\text{DS}}=0\text{V}$	-	-	$\pm 100$	nA
<b>ON Characteristics</b>						
Gate Threshold Voltage	$\text{V}_{\text{TH}}$	$\text{V}_{\text{DS}}=\text{V}_{\text{GS}}$ , $\text{I}_{\text{DS}}=1\text{mA}$	3.5	-	4.5	V
Static Drain-Source On-Resistance	$\text{R}_{\text{DS(on)}}$	$\text{V}_{\text{GS}}=10\text{V}$ , $\text{I}_{\text{DS}}=26.5\text{A}$	-	60	69	mΩ
<b>Dynamic Characteristics</b>						
Input Capacitance	$\text{C}_{\text{iss}}$	$\text{V}_{\text{DS}}=50\text{V}$ $\text{V}_{\text{GS}}=0\text{V}$ Freq.=100KHz	-	4650	-	pF
Output Capacitance	$\text{C}_{\text{oss}}$		-	280	-	
Reverse Transfer Capacitance	$\text{C}_{\text{rss}}$		-	8.6	-	
<b>Switching Characteristics</b>						
Turn-On Delay Time	$\text{T}_{\text{d(on)}}$	$\text{V}_{\text{DD}}=400\text{V}$ $\text{V}_{\text{GS}}=10\text{V}$ $\text{R}_G=25\Omega$ $\text{I}_{\text{DS}}=30\text{A}$	-	129	-	ns
Rise Time	$\text{T}_r$		-	150	-	
Turn-Off Delay Time	$\text{T}_{\text{d(off)}}$		-	100	-	
Fall Time	$\text{T}_f$		-	77	-	
Total Gate Charge	$\text{Q}_g$	$\text{V}_{\text{DS}}=400\text{V}$ $\text{V}_{\text{GS}}=10\text{V}$ $\text{I}_{\text{DS}}=30\text{A}$	-	60.2	-	nC
Gate to Source Charge	$\text{Q}_{\text{gs}}$		-	24.5	-	
Gate to Drain Charge	$\text{Q}_{\text{gd}}$		-	18.7	-	
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage	$\text{V}_{\text{SD}}$	$\text{V}_{\text{GS}}=0\text{V}$ , $\text{I}_{\text{s}}=53\text{A}$	-	-	1.4	V

Notes:

1. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

2.  $\text{V}_{\text{DD}}=100\text{V}$ ,  $\text{V}_{\text{GS}}=10\text{V}$ ,  $\text{L}=10\text{mH}$ ,  $\text{I}_{\text{AS}}=8.3\text{A}$ ,  $\text{R}_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$

3.  $\text{R}_{\theta_{JA}}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.

$\text{R}_{\theta_{JC}}$  is guaranteed by design while  $\text{R}_{\theta_{CA}}$  is determined by the user's board design.  $\text{R}_{\theta_{JA}}$  shown below for single device operation on FR-4 in still air.

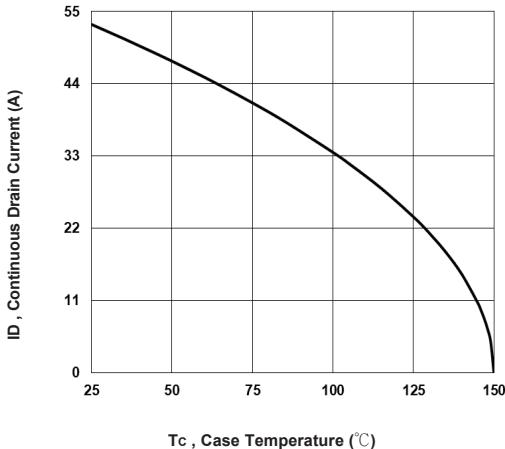


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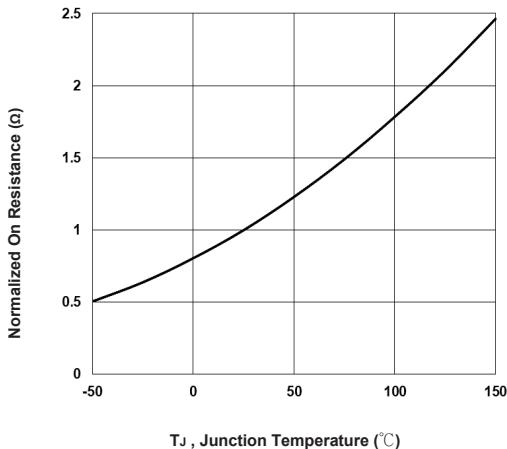
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### Typical Characteristics

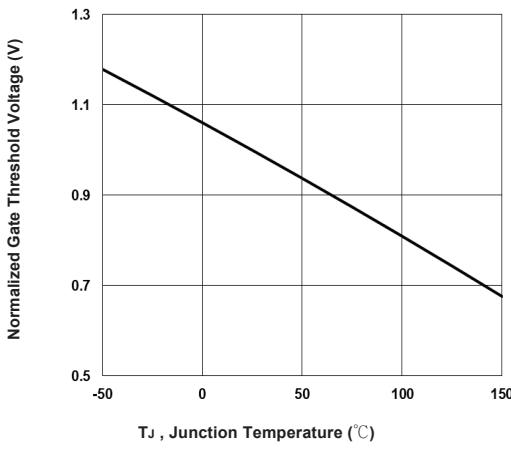
**Fig.1 Continuous Drain Current vs. T<sub>c</sub>**



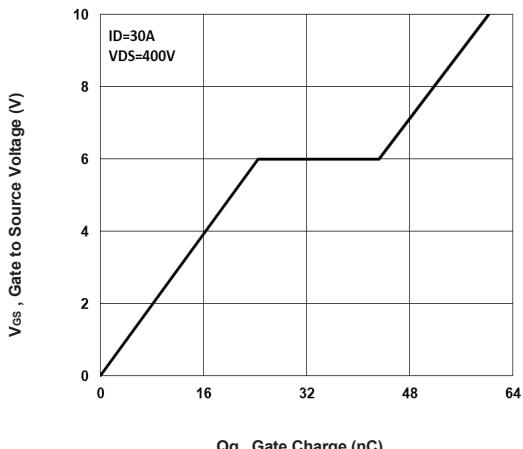
**Fig.2 Normalized RDSON vs. T<sub>J</sub>**



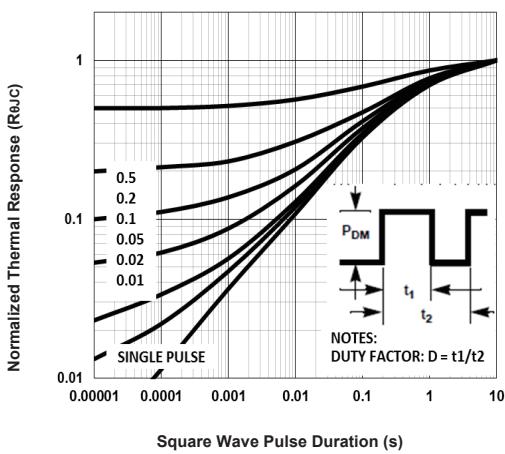
**Fig.3 Normalized V<sub>th</sub> vs. T<sub>J</sub>**



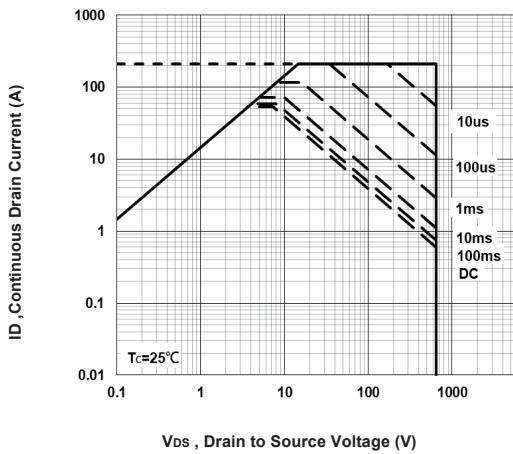
**Fig.4 Gate Charge Waveform**



**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**





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### Typical Characteristics

Fig.7 Switching Time Waveform

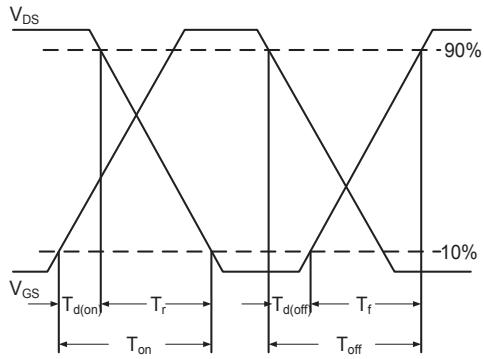


Fig.8 EAS Waveform

